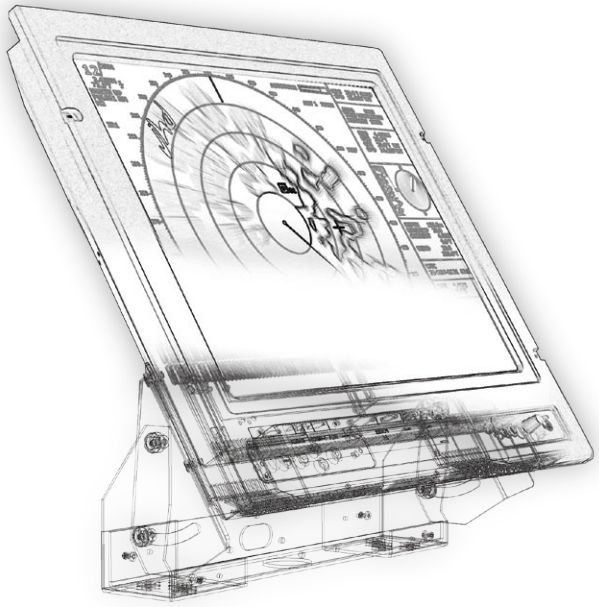
User Manual

HATTELAND® DISPLAY



Maritime Multi Display Models

JH 10T06 MMD - 10.4 inch Maritime Multi Display
JH 15T05 MMD - 15.0 inch Maritime Multi Display
JH 17T01 MMD - 17.4 inch Maritime Multi Display
JH 19T02 MMD - 19.0 inch Maritime Multi Display
JH 20T03 MMD - 20.1 inch Maritime Multi Display
JH 20T05 MMD - 20.1 inch Maritime Multi Display
JH 23T02 MMD - 23.1 inch Maritime Multi Display

Industrial TFT Display Models

JH 10T06 STD - 10.4 inch Industrial TFT Display
JH 15T05 STD - 15.0 inch Industrial TFT Display

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www.hatteland.com

User Manual MMD/TFT Series	
Updated: 17 Mar 2005	Doc Id: INB100005-1 (Rev 9)
For models: (and some variations) -A1, -A2, -C1, -C2, -C3, -C4	

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N-5578 Nedre Vats, Norway

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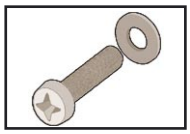
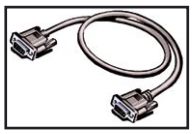
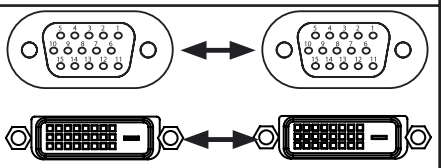
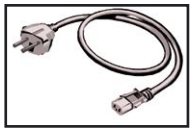
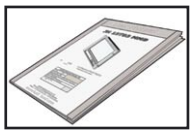
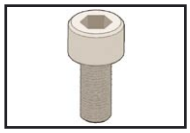
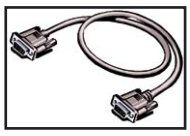
Contents of package

This product is shipped with:

Item	Description	Illustration
	4 pcs of PAN M6X25 black bolts with M6 plastic washer. **These should only be used to secure the display into a console.** *Note: If you prefer your own bolts, make sure they are minimum M6 and 25mm in length for security reasons.*	
	1 pcs of Standard Signal Cable and/or DVI cable. DSUB 15P Male to DSUB 15P Male - Length approx: 2m DVI-D 24P Male to DVI-D 24P Male - Length approx: 2m *Note: DVI cable only included on products that supports DVI.*	
	1 pcs of Standard Power Cable. (European or US standard) - Length approx: 1.9m *Note: Power cable not included in the DC version.*	
	1 pcs of User Manual	

Optional Accessories:

Item	Description	Illustration
	4 pcs of M6X12 Unbraco bolts (Included with bracket) **These should only be used to secure the bracket on the display.** If you prefer your own bolts, make sure they do not exceed 12mm in length. Use any longer will do serious damage to components inside the product!	
	1 pcs of Standard Serial Cable DSUB 9p Male to DSUB 9p Male - Length approx: 1.5m This cable is only included if you purchased a product with touchscreen or remote control serial interface installed.	

General

HATTELAND® DISPLAY

KNOWLEDGE - QUALITY - ECONOMY

Introduction to Jakob Hatteland Display AS

Founded in 1987, Jakob Hatteland Display (JHD), based in Norway, offers the widest range of type approved marine monitors, panel computers and type approved marine computers for the worldwide commercial, naval, yacht and cruise market.

Today the group develops and manufactures a complete range of IEC 60945 tested marine monitors, panel computers and IEC 60945 tested marine computers.

Approved Marine Displays (MMD/STD)

Hatteland Display's marine monitors are based on high quality and state-of-the-art components with the highest specifications, and meet all requirements for harsh maritime use. The displays are easily integrated into your system, due to standardized products and features.

The MMD (Maritime Multi Display) series consists of sizes ranging from 10in to 23in.

Specifically designed for navigation and automation systems on ships, these certified LCD monitors comply to IP66 described in IEC 60925, are tested according to IEC 60945 and are approved by major classification societies such as ABS, BV, ClassNK, DNV, GL and LR. Further to this marine standard, the 19in MMD, the 20in MMD and the 23in MMD marine monitors are also available as ECDIS and ARPA radar-compliant units.

Approved Marine Panel Computers (MMC)

The combination of the reliable design of the marine TFT-LCD modules, together with industrial computer boards, allows Hatteland Display to offer a product range for customer applications where space is critical and full function is desired in a single unit. In particular, the standardized ETX-board form factor allows full flexibility when it comes to processor choice. Because of multiple useful standard components we can offer a highly attractive commercial package

The MMC (Maritime Multi Computer) series consist of sizes ranging from 10in to 23in.

These products have also been designed for typical marine applications in navigation, automation and other systems. Following Hatteland's philosophy, these marine panel computers are fully tested according to IEC 60945 and are designed for type approval.

Approved stand-alone and rack-mounted marine computers

Two concepts are followed to offer variation in size, function and expansion slots for customers: approved black-box computers for limited space and approved computers for standard 19in racks, which offer a high degree of expansion. Configurations according to customer wishes are implicit, such as the operating system, CD-burner, RAM, graphic card, HD, add-on cards, factory installed software and many, many more.

Jakob Hatteland Display AS

The approved computers are tested according to IEC 60945 and IACS E10 and meet the requirements for IEC 61174 (ECDIS). Several approvals by major classification societies such as ABS, BV, ClassNK, DNV, GL and LR are available or pending. The 19in rack computers can be operated up to 70°C.

Flexible display solutions and night vision facilities

All the type-approved displays, panel computers and marine computers offer maximum flexibility for customers' applications. Hatteland Display offers all products with AC or DC power supply, and marine displays and marine panel computers have a fully linear dimmable function for night vision.

Upon the customer's request, specific colour, mechanical or electrical function designs are possible. Many more options are also available, including factory mounted touch screens, sun visors for marine monitors, different Windows or Linux operating systems and brackets

Design and Production

All products are designed and controlled by Hatteland Display in Nedre Vats, Norway. The production and configuration of all products is taking place within Hattelands production plant#1 (opened in September 2003) in Nedre Vats, Norway. Here an extensive manufacturing capacity is available for all products, and can be expanded in the future.

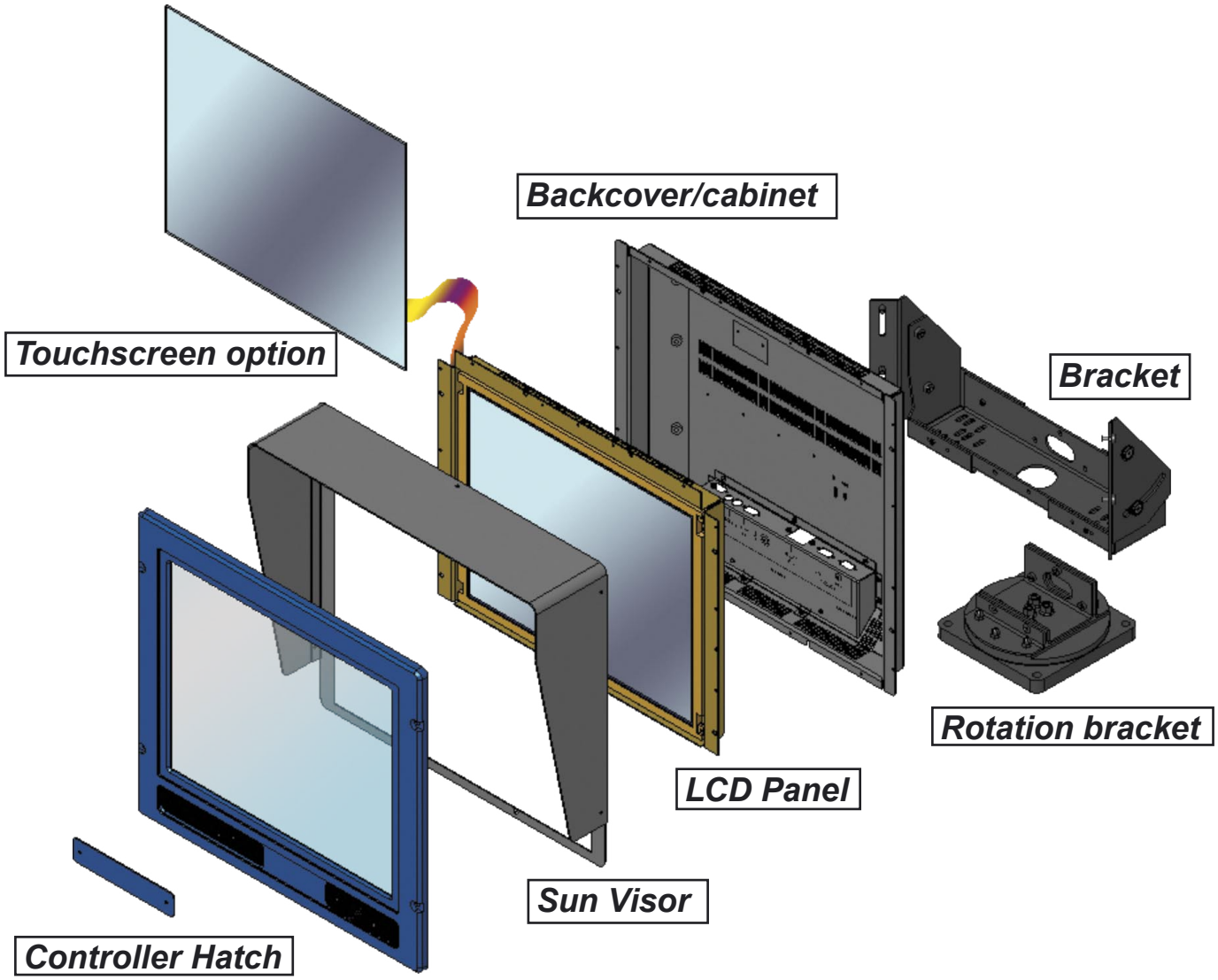
The chosen materials for the production of the products are specifically industrial components and can fulfill form-fit-and-function requests.

About this manual

The manual contains electrical, mechanical and input/output signal specifications. All specifications in this manual, due to manufacturing, new revisions and approvals, are subject to change without notice. However, the last update and revision of this manual are shown both on the frontpage and also in the "Revision History" chapter. Please use that as a reference.

Furthermore, for third party datasheet and user manuals, please see dedicated interactive CD delivered with the product or contact our sales personnel for support.

Basic Construction, Hatteland Display Concept

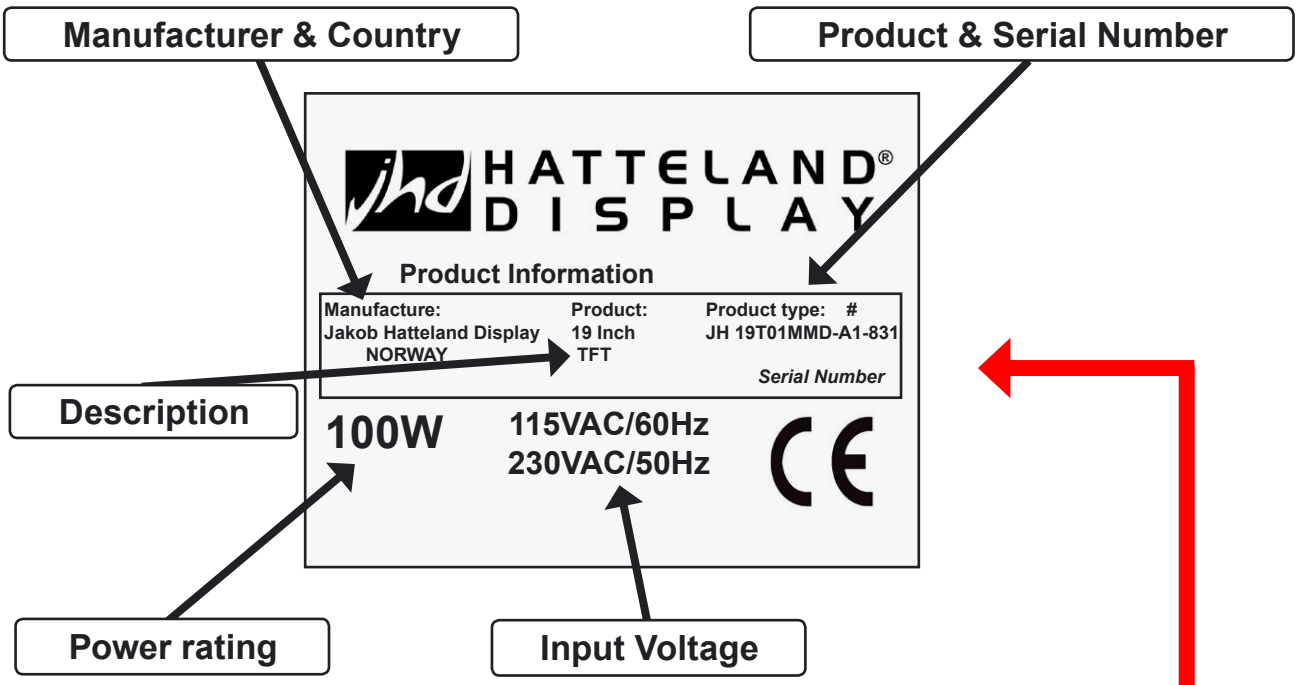


General Display Variations/Models Overview:

A1	= AC Power 115-230 VAC
A2	= DC Power 12-24 VDC (Some have 10-36 VDC)
A3	= AC Power 115-230 VAC including videobuffer
A4	= DC Power 12-24 VDC including videobuffer
C1/C3	= Touchscreen + AC Power 115-230 VAC
C2/C4	= Touchscreen + DC Power 12-24 VDC
E1	= ECDIS Compliant + AC Power 115-230 VAC
E2	= ECDIS Compliant + DC Power 12-24 VDC
Hx	= Same as all above, but with handles on front frame.
MMD	= Dual Input (RGB + VIDEO) Display
MMC	= Complete Maritime Multi Computer + Display Solution
MIL	= Naval Military Dual Input (RGB + VIDEO) Display
STD/VGA	= Single Input RGB Signal

Product Labels (Example)

Serial Number Label



Product Type and Serial Number

```
JH XXAXX AAA-AX-XXX  NOMENCLATURE
JH 19T01 MMD-A1-831  Example
                     Serial Number
                     Sub Version (AC-Odd / DC-Even number)
                     Version (Number & Product Name)
                     TFT (Thin Film Transistor)
                     Display Size (inch)
                     Jakob Hatteland (manufacturer)
```

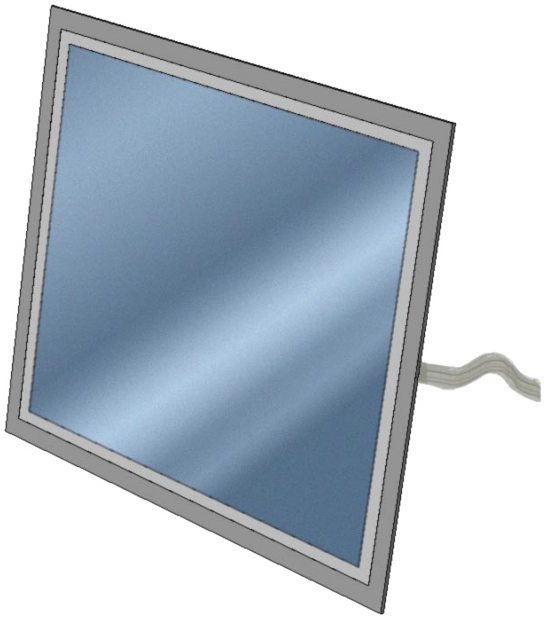
Warranty Label

If you are to perform service on a unit still under warranty, any warranty will be void if this label is damaged or removed. This label is usually located on the back of the product and near the serial number label. This is to help our service department to better determine if there has been any unauthorized service on a product still under warranty.

Capacitive Touchscreen

Introduction to Jakob Hatteland Display products with touchscreen
JHD uses both Resistive and Capacitive touchscreen solutions for their products. Please visit our website to verify what product and touchscreen solution your product have.

Capacitive Touchscreen
Capacitive touchscreens operate using oscillator circuits that are located in each corner of the glass overlay and measure the capacitance of the area to be “touched”. Depending on where the user touches the overlay, the oscillators will vary in frequency. A touchscreen controller then measures the frequency variations to ascertain the coordinates of the person’s touch. This glass overlay has a coating that stores the charge deposited over its surface electrically. It will not operate with either a gloved hand or with a mechanical stylus.



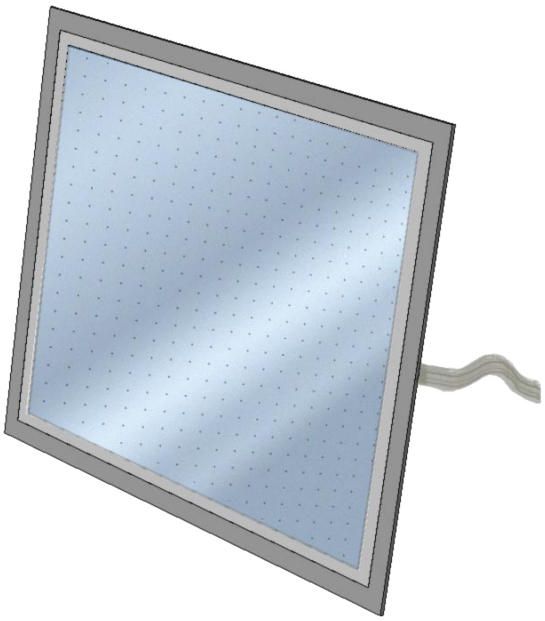
Brief Specifications

Subject	Details
Construction	**Top:** ClearTek protective overcoat protects the sensors and increase durability. **Inside:** Electrode X/Y grid pattern and conductive coating. **Bottom:** Glass and conductive coating. Small amount of voltage is applied to the four corners for measuring X and Y coordinates of the touch point.
Positional Accurancy	Reported touch coordinates are within 1.0% of true position. (Based on viewing area dimensions)
Touch Contact Requirements	3 ms for finger input.
Enduarance Tested	More than 225 million touches in one location without noticable degradation to the surface.
Cleaning	Water, isopropyl, alcohol, and similar non-abrasive cleaners.
Liquid Resistance	Liquids on screen does not impede touchscreen performance.
Light Transmission	Up to 88% at 550 nm; dependant on specific surface finish chosen.

Updated touchscreen drivers and documentation for your operating system:
Please visit our website www.hatteland.com for 3rd party software, drivers and complete documentation for touchscreens. In case of problems, please contact our sales department.

Resistive Touchscreen

Resistive Touchscreen
It generally uses a display overlay composed of layers, each with a conductive coating on the interior surface. Special separator “dots” are distributed evenly across the active area and separate the conductive interior layers.



The pressure from using either a mechanical stylus or finger produces an internal electrical contact at the “action point” which supplies the controller with vertical and horizontal analog voltages for data input. The resistive touchscreens are anti-glare to reduce reflective shine intensity, which will slightly diffuse the light output throughout the screen. Resistive technology activation can be initiated by; a gloved hand, fingernail, mechanical stylus or an ungloved finger.

Brief Specifications

Subject	Details
Construction	**Top:** Polyester with outside hard-surface coating with clear or anti-glare finish. **Inside:** Transparent conductive coating. **Bottom:** Glass substrate with uniform conductive coating. Top and bottom layers separated by separator dots.
Positional Accurancy	Standard deviation of error is less than +- 0.080-inch (2mm).
Touch Activation Force	Typically 57 to 133 g
Expected Life Performance	More than 35 million touches in one location without failure, using a stylus similar to a finger.
Chemical Resistance (Exposed for one hour)	Acetone, Ammonia-based glass cleaners, Common food and beverages, Hexane, Isopropyl alcohol, Methylene chloride, Methyl ethyl ketone, Mineral spirits, Turpentine
Light Transmission	Typically 75% over visible light spectrum.

Updated touchscreen drivers and documentation for your operating system:
Please visit our website www.hatteland.com for 3rd party software, drivers and complete documentation for touchscreens. In case of problems, please contact our sales department.

General Installation Recommendations

Installation and mounting

1. Most of our products are intended for various methods of installation or mounting (panel mounting, bracket mounting, ceiling/wall mounting etc.); for details, please see the relevant mechanical drawings.

2. Adequate ventilation is a necessary prerequisite for the life of the product. The air inlet and outlet openings must definitely be kept clear; coverings which restrict ventilation are not permissible.

3. Do not install the unit in a horizontal position (laying down), as this will cause heat to build up inside the display which will damage the LCD Panel. To prevent this problem we recommend installing the unit in a vertical position (±30 degrees) to improve the airflow through the unit.

4. Exposure to direct sunlight can cause a considerable increase in the temperature of the unit, and might under certain circumstances lead to overtemperature. This point should already be taken into consideration when the bridge equipment is being planned (sun shades, distance from the windows, ventilation, etc.)

5. Space necessary for ventilation, for cable inlets, for the operating procedures and for maintenance, must be provided.

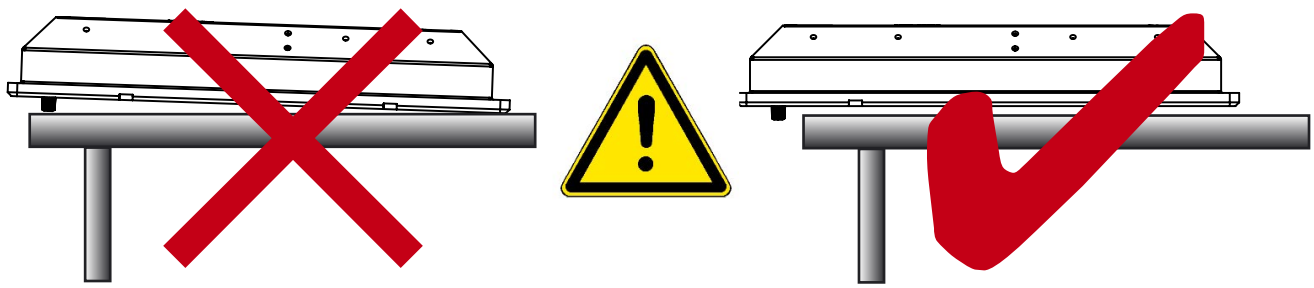
6. To further improve the cooling of the unit we recommend installing Cooling Fans underneath blowing upwards into the unit air inlet. This may be required in high temperature applications and also when there is reason to expect temperature problems due to non-optimal way of mounting(Ref.2-5).

7. If the push buttons of the product are not illuminated, an external, dimmable illumination (IEC 60945, 6.5.c, e.g. Goose neck light is required for navigational use.

8. Information about necessary pull-relievers for cables is given in the installation drawings. Attention must be paid to this information so that cable breaks will not occur, e.g. during service work.

Brightness knob precaution

Please be aware of the risk of breaking or bending the brightness knob. The brightness knob should be free of any obstruction.



General Installation Recommendations

Ergonomics

1. Adjust the unit height so that the top of the screen is at or below eye level. Your eyes should look slightly downwards when viewing the middle of the screen.

2. Adjust screen inclination to remain gaze angle to the centre of the screen approximately perpendicular to the line of gaze.

3. When products are to be operated both from a sitting position and from a standing position, a screen inclination of about 30° to 40° (from a vertical plane) has turned out to be favourable.

4. The brightness of displays is limited. Sunlight passing directly through the bridge windows - or its reflection - which falls upon the screen workplaces must be reduced by suitable means (negatively inclined window surfaces, Venetian blinds, distance from the windows, dark colouring of the deckhead)

5. Units in the bridge wing area must be installed or mounted by suitable alignment or bulkhead/ deckhead mounting in such a way that reflections of light from the front pane of the display are not directed into the observer's viewing direction.

6. The use of ordinary commercial filter plates or filter films is not permitted for items of equipment that require approval (by optical effects, "aids" of that kind can suppress small radar targets, for example).

General mounting instructions

- The useful life of the components of all Electronics Units generally decreases with increasing ambient temperature; it is therefore advisable to install such units in air-conditioned rooms. If there are no such facilities these rooms must at least be dry, adequately ventilated and kept at a suitable temperature in order to prevent the formation of condensation inside the display unit.

- With most Electronic Units, cooling takes place via the surface of the casing. The cooling must not be impaired by partial covering of the unit or by installation of the unit in a confined cabinet.

- In the area of the wheel house, the distance of each electronics unit from the magnetic standard compass or the magnetic steering compass must not be less than the permitted magnetic protection distance.

This distance is measured from the centre of the magnetic system of the compass to the nearest point on the corresponding unit concerned.

- Units which are to be used on the bridge wing must be installed inside the "wing control console" protected against the weather. In order to avoid misting of the viewing screen, a 25 ... 50 W console-heating (power depending on the volume) is recommended.

- When selecting the site of a display unit, the maximum cable lengths have to be considered.

General Installation Recommendations

- The impairment of read-out from a display screen by direct light from lamps or the sun must be avoided. Rear windows must be blacked out by means of roller blinds or Venetian blinds.

- Disturbing reflections on the screen of a display caused by pilot lamps and illuminated signs must be prevented by suitable measures (screening or relocating).

- When a product is being installed, the surface base or bulkhead must be checked to ensure that it is flat in order to avoid twisting of the unit when the fixing screws are tightened, because such twisting would impair mechanical functions. Any unevenness should be compensated for by means of spacing-washers.

- The grounding screws of the units must be connected to the body of the ship (ground); the wire used should have a cross sectional area of at least 6 mm^2.

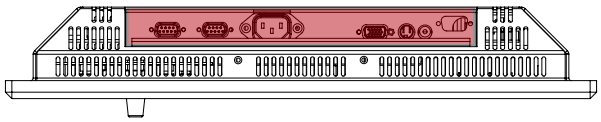
- Transportation damage, even if apparently insignificant at first glance, must immediately be examined and be reported to the freight carrier. The moment of setting-to-work of the equipment is too late, not only for reporting the damage but also for the supply of replacements.

Cables

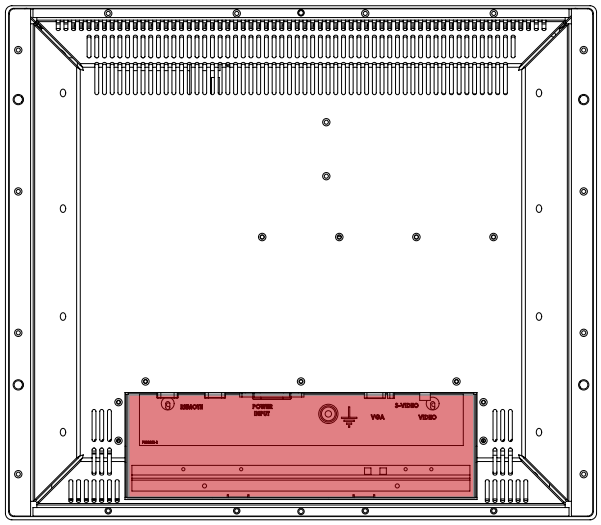
Use only high quality shielded signal cables. For RGB/DVI cables use only cables with separate coax for Red, Green and Blue. Jakob Hatteland Display can supply a varity of high quality RGB/DVI, RS232, PARALLEL, LAN and USB cables intended for this use.

Cable Entries & Connectors (Marked area) - Illustration only

Bottom View



Back View



General Installation Recommendations

Maximum Cable Length

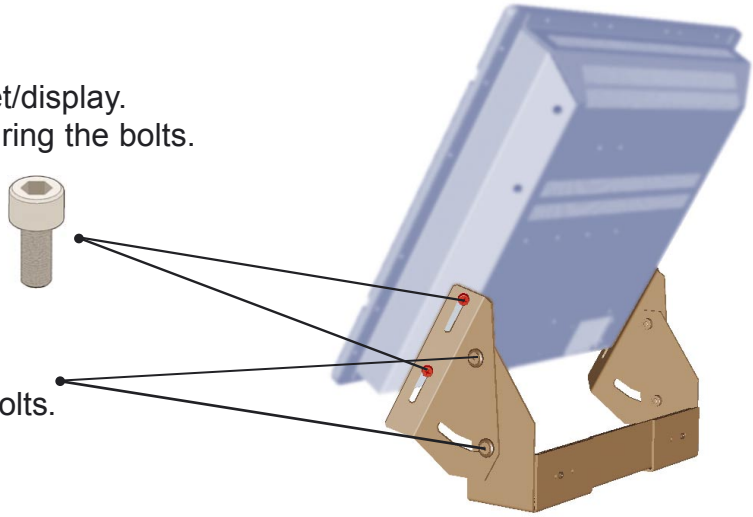
The RGB/DVI cable should generally be kept as short as possible to provide a high quality output on the display. The maximum cable length will depend on the signal resolution and frequency, but also on the quality of the signal output from the computer. We recommend using 60Hz vertical frequency for our displays.

Cables up to 10 meters generally provides good picture quality even with a 1600x1200 (UXGA) 60Hz signal. In most cases (especially with lower resolutions) even longer cables will provide a satisfactory result. This should however be tested in advance before making the decision on how far the unit can be placed from the signal source.

Standard Bracket

When mounting the bracket on the MMD/STD products, the length of the bolts should not exceed 12mm. Using any longer bolts will do serious damage to components inside the product, and will void warranty!

Mount bolts on both sides of the bracket/display.
You make any adjustments before securing the bolts.

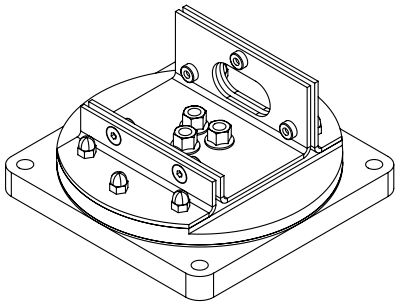


Adjust the tilting angle and secure the bolts.

Note: MMC bracket may vary in placement and design, but length of bolts should not exceed 12mm.

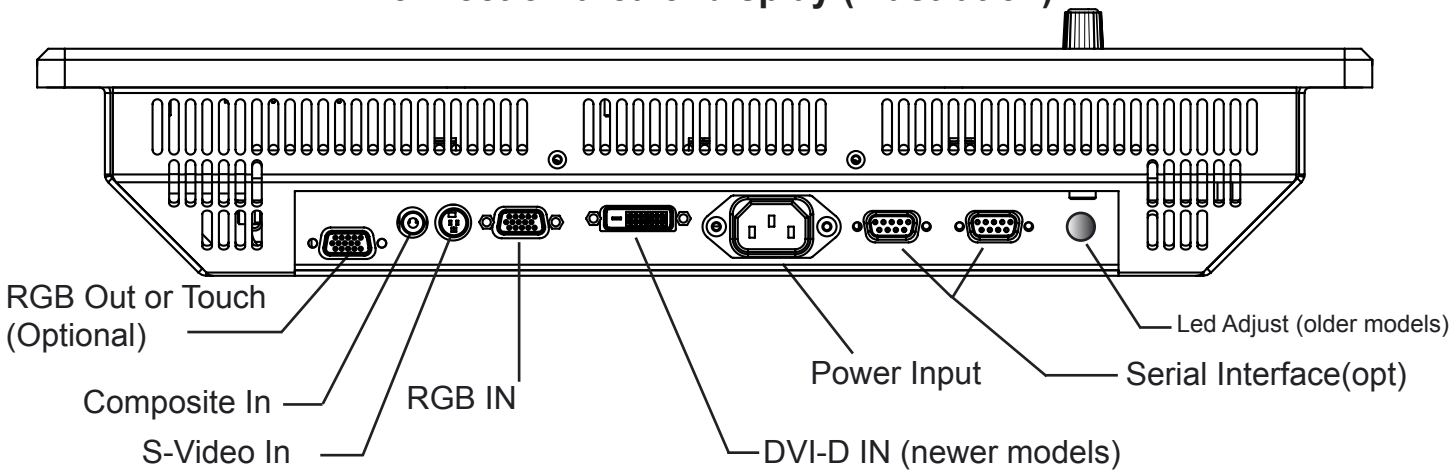
Rotary Bracket

This can only be mounted if your product is equipped with a **Standard Bracket**.
Use the provided bolts to secure it. You may choose your own bolts to secure it to a table or desktop, recommended size are: M10 and minimum 30mm in length. The rotary bracket can be rotated 180°

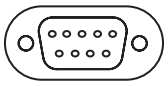


Physical Connections - MMD/STD Models

Connection area of display (illustration)



NOTE: Available connectors/locations may vary depending on model !



TOUCHSCREEN / VGA OUT: (optional)

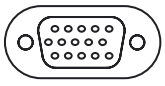
Connect the RS-232 cable to the D-SUB 9P Connector (female) on the rear side of the TFT display.
Connect the other end to your COM port of your computer. Install the nesscessary software to operate it.
- Note that the connector is only installed upon customer request. VGA OUT connector is then removed.
- By factory standards the product have been mounted with a VGA OUT 15PIN DSUB connector, this signal is a clone of the incoming signal.

COMPOSITE IN (PAL/NTSC/SECAM VIDEO):

Connect your composite video signal cable into the RCA jack plug. To activate the Picture In Picture function, the TFT display must be configured via the OSD menus.
- Note that *Composite Video* must be selected as the incoming video source in the OSD menu.

S-VIDEO IN:

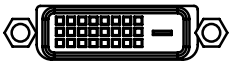
Connect your S-Video (SVHS) video signal cable into the mini 4-way din plug. It can only be inserted one way and make sure you don't bend any of the pins inside your cable. To activate the Picture In Picture function, the TFT display must be configured via the OSD menus.
- Note that *S-Video* must be selected as the incoming video source in the OSD menu.



RGB IN:

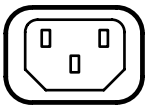
Connect the VGA cable to the D-SUB 15P Connector (female) on the rear side of the TFT display.
If possible, screw the VGA cable to the D-SUB connector and make sure you don't bend any of the pins inside the VGA cable connector. To reduce tension of the VGA cable, secure it to the base mounted cable tie clamp. Connect the other end of the cable to the VGA output of your computer, and fasten it there also.

Physical Connections - MMD/STD Models



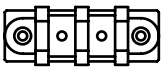
DVI-D IN:

Connect the DVI cable to the DVI-D 24P Connector (female) on the rear side of the TFT display.
If possible, screw the DVI cable to the DVI-D connector and make sure you don't bend any of the pins inside the DVI cable connector. To reduce tension of the DVI cable, secure it to the base mounted cable tie clamp. Connect the other end of the cable to the DVI-D output of your computer, and fasten it there also.



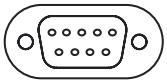
POWER INPUT: (AC Version)

The internal AC power module supports both 115VAC/60Hz and 230/50Hz power input. You may secure the cable further by mounting it to the base mounted cable tie clamp.



POWER INPUT: (DC Version)

Secure the cables (check polarity!) to the screw terminal, you may secure the cable further by mounting it to the base mounted cable tie clamp. The internal DC power module supports voltage from 12 to 24 VDC.



SERIAL INTERFACE: (optional)

The two serial remote control connectors are used for displays with the JHSCOM-A1 or JHSCOM-B1.
It features a RS232/RS422/RS485 interface for controlling all parameters, including brightness, for the display. For further information, see the "Control Interface" under support - www.hatteland.com

LED ADJUST: (Only on older versions)

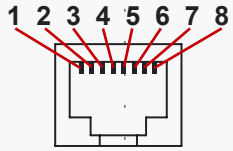
The led adjust is only present in displays described in the chapter *automatic power light dimming*. With the led adjust knob, you can manually adjust the intensity of the power light indicator which is located in the front of the display. The power light indicator is controlled by the Auto Power LED Dimming function which automatically adjusts the intensity of the power light based on your environment lightning. You could also turn it off if that is necessary.

Note:
If you have optional accessories beyond these standard connectors described here, please visit our website at www.hatteland.com for separate documentation/specifications regarding accessories (when made available).

Pin Assignments - Common Connectors

Note: Not all connectors may be available on your specific product. This depends on the amount of additional hardware installed from factory, or customized solutions. These pin assignments are for the common connectors used.

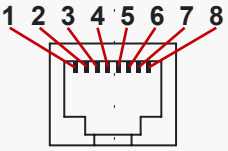
Pin Assignments - RJ45 10/100 LAN



Pin 01 - TDP	Transmit Differential Pair (Positive)
Pin 02 - TDN	Transmit Differential Pair (Negative)
Pin 03 - RDP	Receive Differential Pair (Positive)
Pin 04 - NC	Not Connected
Pin 05 - NC	Not Connected
Pin 06 - RDN	Receive Differential Pair (Negative)
Pin 07 - NC	Not Connected
Pin 08 - NC	Not Connected

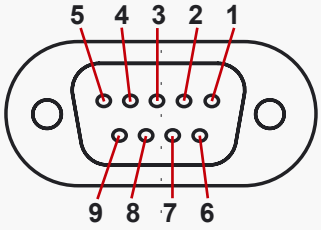
Use category 5 - twisted pair cable

Pin Assignments - RJ45 10/100/1000 GBLAN



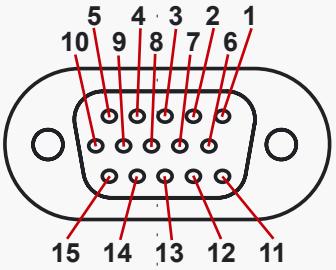
Pin 01 - D0P	Differential Pair 0 (Positive)
Pin 02 - D0N	Differential Pair 0 (Negative)
Pin 03 - D1P	Differential Pair 1 (Positive)
Pin 04 - D2P	Differential Pair 2 (Positive)
Pin 05 - D2N	Differential Pair 2 (Negative)
Pin 06 - D1N	Differential Pair 1 (Negative)
Pin 07 - D3P	Differential Pair 3 (Positive)
Pin 08 - D3N	Differential Pair 3 (Negative)

Pin Assignments - 9P Serial COM RS232



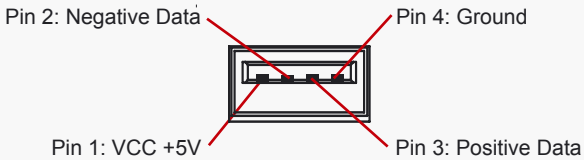
Pin 01 - DCD	Data Carry Detect
Pin 02 - SIN	Serial In or Receive Data
Pin 03 - SOUT	Serial Out or Transmit Data
Pin 04 - DTR	Data Terminal Ready
Pin 05 - GND	Ground
Pin 06 - DSR	Data Set Ready
Pin 07 - RTS	Request To Send
Pin 08 - CTS	Clear To Send
Pin 09 - RI	Ring Indicate

Pin Assignments - 15P HD RGB VGA

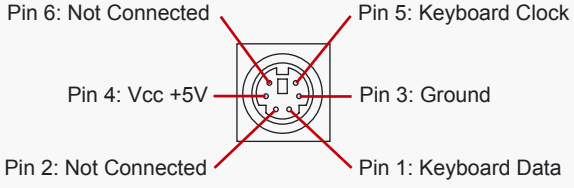


Pin 01	Red, analog
Pin 02	Green, analog
Pin 03	Blue, analog
Pin 04	Reserved for monitor ID bit 2 (grounded)
Pin 05	Digital ground
Pin 06	Analog ground red
Pin 07	Analog ground green
Pin 08	Analog ground blue
Pin 09	+5V power supply for DDC (optional)
Pin 10	Digital ground
Pin 11	Reserved for monitor ID bit 0 (grounded)
Pin 12	DDC serial data
Pin 13	Horizontal sync or composite sync, input
Pin 14	Vertical sync, input
Pin 15	DDC serial clock

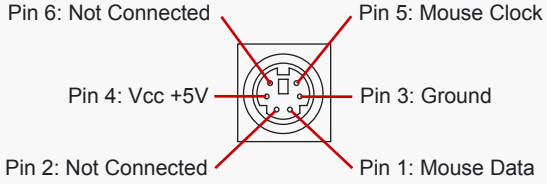
Pin Assignments - USB



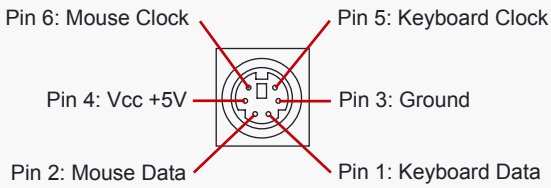
Pin Assignments - 5P PS/2 KEYBOARD



Pin Assignments - 5P PS/2 MOUSE

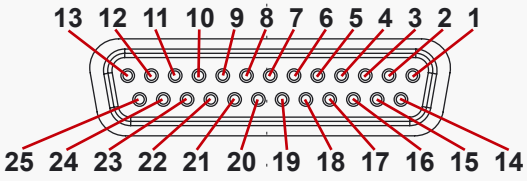


Pin Ass. - 5P PS/2 KEYBOARD+MOUSE Combined



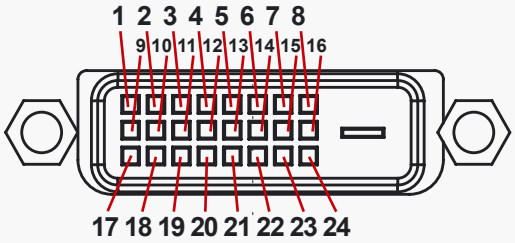
Pin Assignments - Common Connectors

Pin Assignments - 25P Parallel



Pin 01 - STROBE	This signal indicates to the printer that data at PD7..0 are valid.
Pin 02 - DATA0	Parallel data bus from PC board to printer. The data line are able to operate in PS/2 compatible bi-directional mode.
Pin 03 - DATA1	Same as Pin 02
Pin 04 - DATA2	Same as Pin 02
Pin 05 - DATA3	Same as Pin 02
Pin 06 - DATA4	Same as Pin 02
Pin 07 - DATA5	Same as Pin 02
Pin 08 - DATA6	Same as Pin 02
Pin 09 - DATA7	Same as Pin 02
Pin 10 - ACK	Signal from printer indicating that the printer has received the data and is ready to accept further data.
Pin 11 - BUSY	Signal from printer indicating that the printer cannot accept further data.
Pin 12 - PE	Signal from printer indicating that the printer is out of paper.
Pin 13 - SELECT	Signal from printer to indicate that the printer is selected.
Pin 14 - AUTO FEED	This active low output causes the printer to add a line feed after each line printed.
Pin 15 - ERR#	Signal from printer indicating that an error has been detected.
Pin 16 - INIT#	This active low output initialises (resets) the printer.
Pin 17 - SLIN#	Signal to select the printer sent from CPU board to printer.
Pin 18 - GND	Ground
Pin 19 - GND	Ground
Pin 20 - GND	Ground
Pin 21 - GND	Ground
Pin 22 - GND	Ground
Pin 23 - GND	Ground
Pin 24 - GND	Ground
Pin 25 - GND	Ground

Pin Assignments - 24P DVI-D



Pin 01	T.M.D.S. Data2 -
Pin 02	T.M.D.S. Data2 +
Pin 03	T.M.D.S. Data2/4 Shield
Pin 04	T.M.D.S. Data4 -
Pin 05	T.M.D.S. Data4 +
Pin 06	DDC Clock
Pin 07	DDC Data
Pin 08	Not Connected
Pin 09	T.M.D.S. Data1 -
Pin 10	T.M.D.S. Data1 +
Pin 11	T.M.D.S. Data1/3 Shield
Pin 12	T.M.D.S. Data3 -
Pin 13	T.M.D.S. Data3 +
Pin 14	+5V Power
Pin 15	Ground (for +5V)
Pin 16	Hot Plug Detect
Pin 17	T.M.D.S. Data0 -
Pin 18	T.M.D.S. Data0 +
Pin 19	T.M.D.S. Data0/5 Shield
Pin 20	T.M.D.S. Data5 -
Pin 21	T.M.D.S. Data5 +
Pin 22	T.M.D.S. Clock Shield
Pin 23	T.M.D.S. Clock +
Pin 24	T.M.D.S. Clock -

DDC = Display Data Channel
T.M.D.S = Transition Minimized Differential Signal

User Controls
MMD Products

Operation

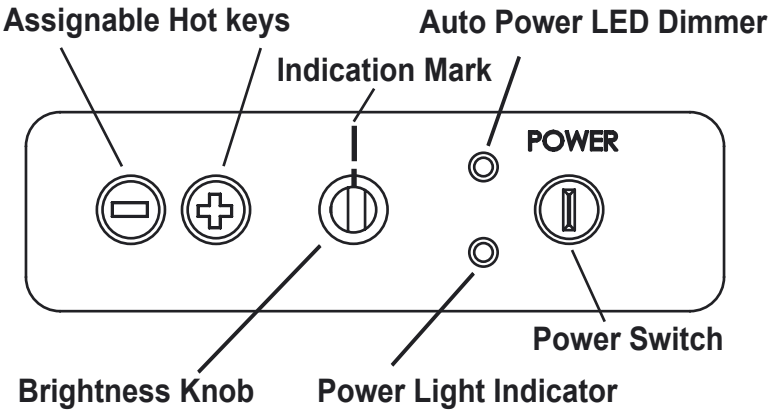
POWER SWITCH:

This TFT display features a Instant-ON/Delay-OFF switch, which ensures that the display is not turned off by user accident.

Power ON: To turn the display on, press down the power switch. The power light indicator will turn green.

(If no RGB signal sync is present, "NO SYNC" message will appear in the display)

Power OFF: To turn the display off, press and hold the power switch down for 3 seconds.



DISPLAY ADJUSTMENT CONTROLS:

This TFT display features a 100% dimmable image, which means it is capable of displaying a completely black image when the BRIGHTNESS knob is turned fully to the left.

NOTE1: The design and placement of the user / osd controls may vary from product to product !
NOTE2: For ECDIS systems the brightness knob indication mark should be aligned directly with the indication mark located on the label. (See illustration above)

AUTOMATIC POWER LIGHT DIMMING:

This TFT display features a Power LED Dimmer function which control the light intensity of the power light indicator. There are two different solutions for this feature.

1- Intelligent Auto Power LED Dimmer which control the light intensity based on your environment lightning. This can also be manually adjusted using the Led Adjust knob on the rear side of the display.
2- The light intensity is regulated according to the backlight, that is according to the brightness knob. With the exception that when the backlight brightness is zero, the power led is just visible in dark environment. This means that the power led is not visible in daylight when the brightness knob is turned fully to the left.

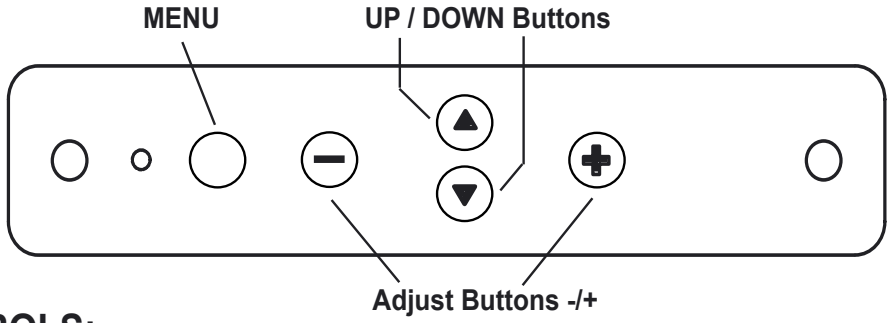
Note:

If there is a led adjustment knob at the connection area of the display as described in **"INSTALLATION AND RECOMMENDATIONS"** chapter, the manner of operation described in paragraph one applies. For displays produced after the creation date of this manual, paragraph two applies. For displays produced before year 2002, paragraph one applies.

ASSIGNABLE HOT KEYS:

The user can assign various display functions as hot keys (increase/decrease).
This will enable the user to quickly adjust the brightness, image size, contrast or other functions to control the image. To assign these hot keys, enter the **"UTILITIES MENU/DIRECT ACCESS"** menu and change them to the desired hot key function. Default hot keys are set to increase/decrease volume.

Operation



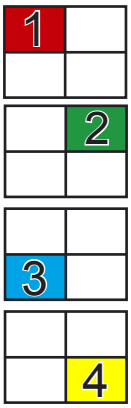
USER CONTROLS:

The On Screen Display (OSD menu) controls are located under the metal hatch on the left side of the display. To begin understanding the menu and its usage, just follow these steps for a quick start.

1: Press the “MENU” button. The OSD menu will show all the available functions you can adjust or control.
2: You can move to the next icon by pressing “MENU”.
3: Select options within icon menu by pressing “UP” or “DOWN” buttons. The selected option will turn yellow.
4: Use “+” or “-” buttons to increase/decrease values.
5: Move the selection left or right by using “+” or “-” buttons. The selected option will turn green.
6: To confirm the selection, press “+” button. To abort press “-” button.

OSD MENU:

The On Screen Display (OSD menu) contains several functions that will let the user to adjust or setup the display to their preferred setting. The functions are shown as easy understandable icons. Some of the menus have sub-menus, use “+” to access and “MENU” to go back to the previous menu. The OSD menu consists of 4 modes: (Icon beside function indicates if it’s available in that mode)



Mode 1 - Available functions in **RGB / DVI* MODE Simplified OSD Menu - (Logo will appear)**
User can adjust the most common functions needed to operate the display.
**Some functions are not available in DVI mode*

Mode 2 - Available functions in **RGB / DVI* MODE Advanced OSD Menu - (No logo will appear)**
User can access more advanced functions. (Service menu)
**Some functions are not available in DVI mode*

Mode 3 - Available functions in **VIDEO MODE Simplified OSD Menu - (Logo will appear)**
User can adjust the most common functions needed to operate the display.

Mode 4 - Available functions in **VIDEO MODE Advanced OSD Menu - (No logo will appear)**
User can access more advanced functions. (Service menu)

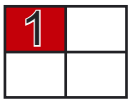
RGB/DVI MODE = When RGB/DVI signal (i.e OS or radar / charts) are displayed full screen.
VIDEO MODE = When video signal (i.e CAMERA / VCR / DVD) are displayed full screen.

To access the “Advanced” OSD Menu, you must press and hold the “DOWN” button while turning power on. When picture appears, release the “DOWN” button and press “MENU” to access the “Advanced” functions. If you have the “Memorized state” version of the OSD menu, use the same procedure to switch between “Advanced” or “Simplified” modes. For more information about “Memorized state”, see the “NOTES” section in this manual.

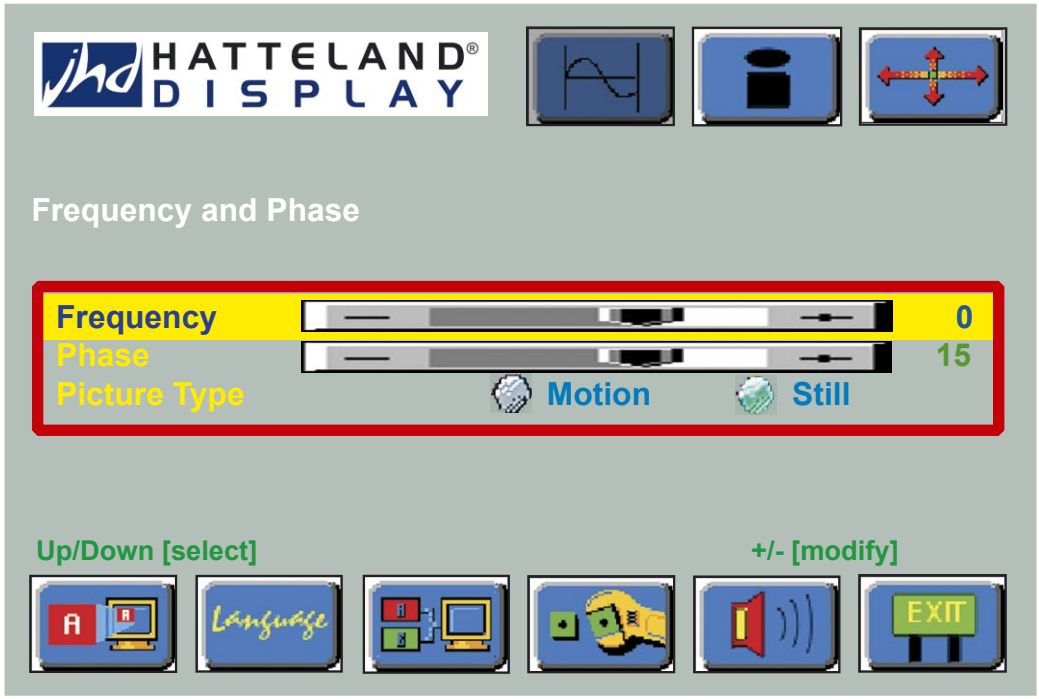
WARNING !! ONLY A QUALIFIED SERVICE ENGINEER SHOULD ACCESS SERVICE MENU PERFORMANCE OF THE DISPLAY MAY BE SERIOUSLY AFFECTED.

OSD Menu Overview

Mode 1 - Function layout in **RGB / DVI MODE Simplified OSD Menu: (User menu)**

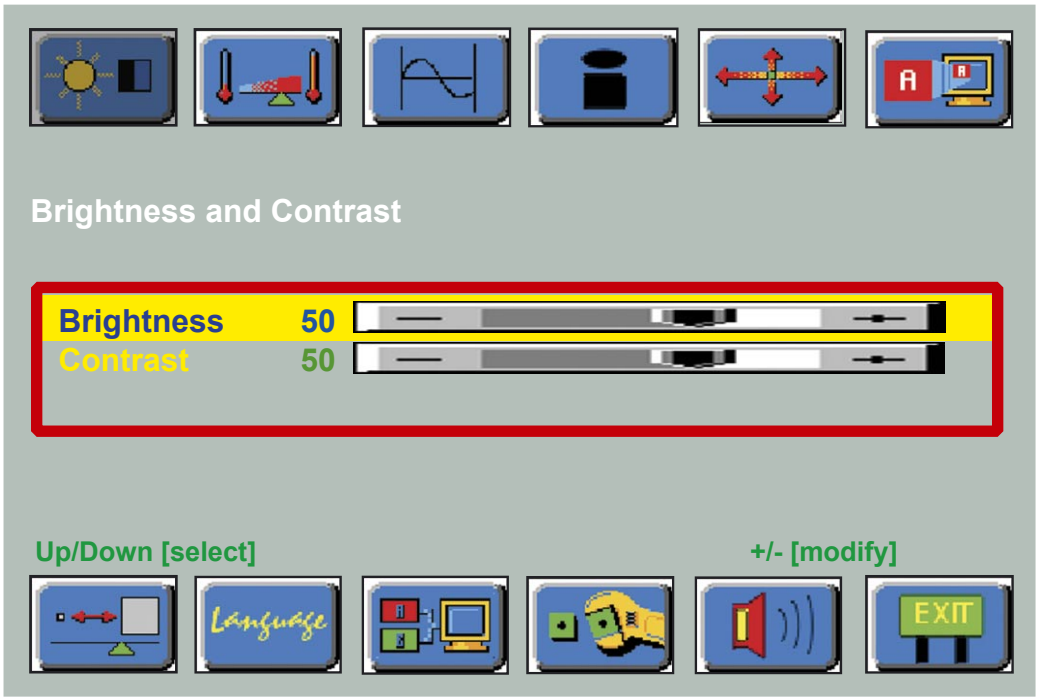


Note that to be in RGB / DVI MODE, a computer signal must be present in full screen, i.e Windows or other operating system/radar system. Having a PIP view simultaneously will not interfere or change the menu structure in any way.



Mode 2 - Function layout in **RGB / DVI MODE Advanced OSD Menu: (Service menu)**

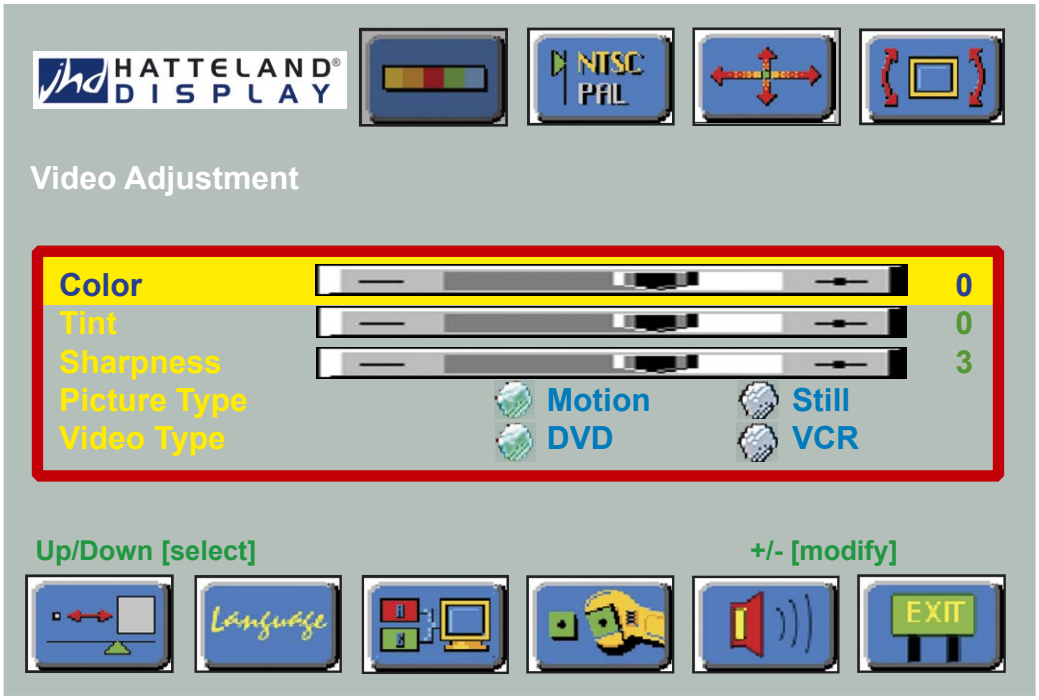
Note that to be in RGB / DVI MODE, a computer signal must be present in full screen, i.e Windows or other operating system/radar system. Having a PIP view simultaneously will not interfere or change the menu structure in any way.



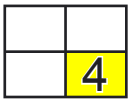
OSD Menu Overview

Mode 3 - Function layout in **VIDEO MODE Simplified OSD Menu: (User menu)**

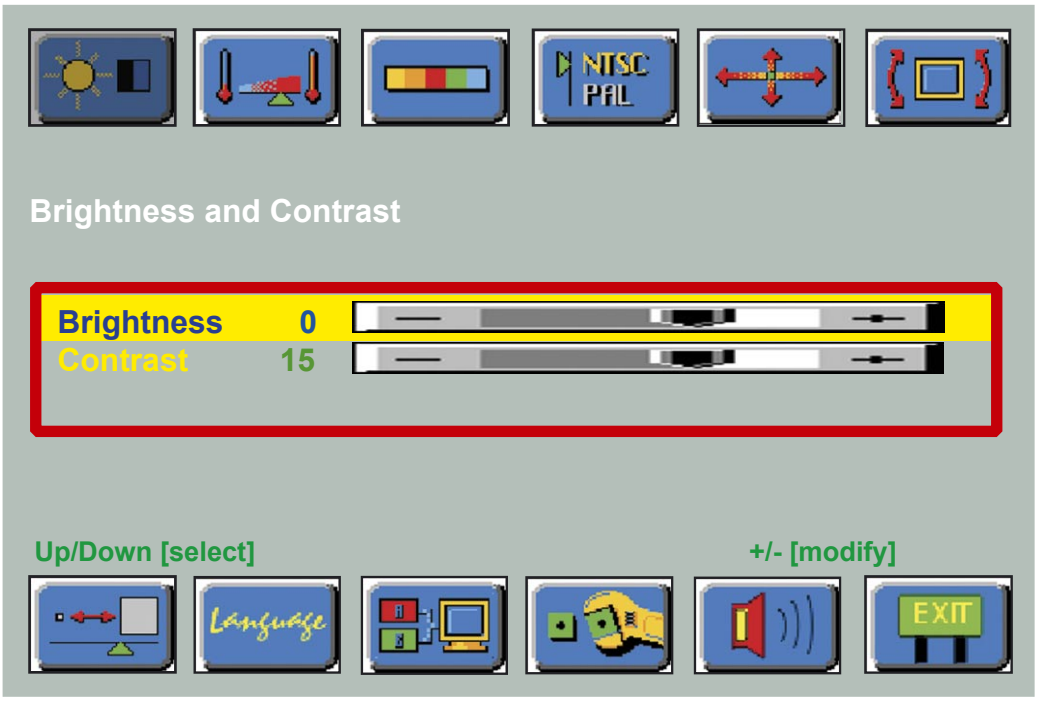
Note that to be in VIDEO MODE, a video signal must be present in full screen, i.e from a camera, VCR or DVD player.



Mode 4 - Function layout in **VIDEO MODE Advanced OSD Menu: (Service menu)**



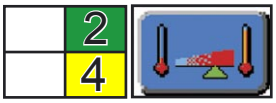
Note that to be in VIDEO MODE, a video signal must be present in full screen, i.e from a camera, VCR or DVD player.



OSD Menu Functions

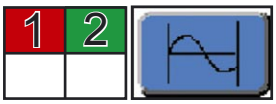
BRIGHTNESS AND CONTRAST: (No function in DVI mode)
Selecting this function will enable the user to adjust brightness and contrast for the display.

BRIGHTNESS: Increase/decrease brightness level, total: 100 steps
CONTRAST: Increase/decrease contrast level, total: 100 steps



COLOR TEMPERATURE:
Selecting this function will enable the user to modify the warmness of the picture. Higher temperature = “cooler” picture. Lower temperature = “warmer” picture.

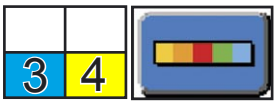
User can select between *9500K, 8000K, 6500K,* and *5000K* color temperature measured in Kelvin degrees. Press “+” to access the sub-menu, where the RGB values can be adjusted. Use “+” and “-” buttons to adjust these values, and “MENU” to exit. (Saving is done automatically)



FREQUENCY AND PHASE: (No function in DVI mode)
Selecting this function will enable the user to modify the image horizontal size and fine tune the image quality.

FREQUENCY: Increase/decrease the image horizontal size.
PHASE: Fine tune the data sampling position (adjust image quality.)

PICTURE TYPE : Motion / Still (Adjustment for best image quality)
If graphics on screen move a lot, select “Motion”
If graphics on screen are mostly still, select “Still”



VIDEO ADJUSTMENT:
Selecting this function will enable the user to modify the color saturation of the picture, tint and sharpness.

COLOR: Increase/decrease video color level.
TINT: Increase/decrease tint level.
SHARPNESS: Increase/decrease video image sharpness level.

PICTURE TYPE : Motion / Still / Normal (Adjustment for best image quality)
If graphics on screen move a lot, select “Motion”
If graphics on screen are mostly still, select “Still”
General motion - non flicker mode, select “Normal”

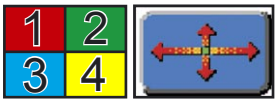
VIDEO TYPE : Change to best match the source signal. (DVD / VCR)

VIDEO SYSTEM:
Selecting this function will enable the user to select video system and input signals.

AUTO : Automatic detection of NTSC or PAL system. (Not applicable in SECAM)
NTSC / NTSC 4.43 : Manual select NTSC system.
PAL / PAL M : Manual select PAL system.
SECAM : Manual select SECAM system.

OSD Menu Functions

STATUS:
Selecting this function will display graphic information such as resolution and frequency.



POSITION: (No function in DVI mode)
Selecting this function will enable the user to position the image within the display area.

IMAGE UP/DOWN : Position the image vertically using “UP” or “DOWN” buttons.
IMAGE LEFT/RIGHT : Position the image horizontally using “+” or “-” buttons.

PICTURE IN PICTURE:
Selecting this function will enable the user to configure PIP window size, input signal source, horizontal and vertical position and more.

PIP SIZE : Select PIP window size. Choose between OFF, SIZE1, SIZE2 or SIZE3.
PIP SOURCE : Select video source to be displayed in PIP window.

Choose between AUTO, COMP, SVID:

AUTO = automatic detection of Composite, S-Video.
COMP = manual select composite video signal only.
SVID = manual select S-Video signal only.

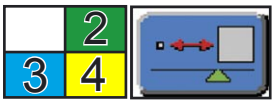
HORIZONTAL POSITION: Adjust the position of the PIP window horizontally.
VERTICAL POSITION: Adjust the position of the PIP window vertically.

ADVANCED PIP SETTINGS: (Press “+” to access the sub-menu)

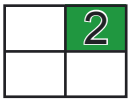
BRIGHTNESS: Increase/decrease the image brightness of the PIP window.
CONTRAST: Increase/decrease the image contrast of the PIP window.
SHARPNESS: Increase/decrease the image sharpness of the PIP window.
TINT: Increase/decrease the tint of the image of the PIP window.
COLOR: Increase/decrease the color of the image of the PIP window.

ROTATION:
Selecting this function will enable the user to rotate the image to either landscape or portrait format.

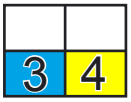
OSD Menu Functions



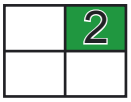
GRAPHIC SCALING MODES:
Selecting this function will enable the user to configure the graphic scaling of the PC or VIDEO image.



Scaling methods in PC/DVI MODE: ONE TO ONE, FILL SCREEN, FILL TO ASPECT RATIO, NONLINEAR SCALING MODES

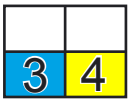


Scaling methods in VIDEO MODE: NORMAL, LETTERBOX, LETTERBOX WITH SUBTITLES, NONLINEAR SCALING MODES



ONE TO ONE: (Press "+" to access the sub-menu)

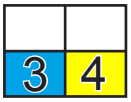
HORIZONTAL PAN: Increase/decrease the horizontal pan.
VERTICAL PAN: Increase/decrease the vertical pan.



NORMAL: (Press "+" to access the sub-menu)

HORIZONTAL CLIPPING: Increase/decrease the horizontal clipping.
HORIZONTAL OFFSET: Increase/decrease the horizontal offset.
HORIZONTAL STRETCH: Increase/decrease the horizontal stretch.
VERTICAL CLIPPING: Increase/decrease the vertical clipping.
VERTICAL OFFSET: Increase/decrease the vertical offset.
VERTICAL STRETCH: Increase/decrease the vertical stretch.

FILL SCREEN : Enable full screen expansion for lower resolution image.
FILL TO ASPECT RATIO : Enable full screen expansion for lower resolution image according to aspect ratio.



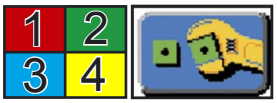
LETTERBOX : Stretches a letterboxed picture to full screen.
LETTERBOX WITH SUBTITLES : Stretches and pans a letterboxed picture to full screen, which enables viewing of subtitles in bottom.

NONLINEAR SCALING MODES: (Press "+" to access the sub-menu)

HORIZONTAL CLIPPING: Increase/decrease the horizontal clipping.
HORIZONTAL OFFSET: Increase/decrease the horizontal offset.
HORIZONTAL STRETCH: Increase/decrease the horizontal stretch.
VERTICAL CLIPPING: Increase/decrease the vertical clipping.
VERTICAL OFFSET: Increase/decrease the vertical offset.
VERTICAL STRETCH: Increase/decrease the vertical stretch.

LANGUAGE:
Available languages are: English, Danish and Simplified Chinese. This will affect all text and messages in the OSD menus.

OSD Menu Functions



UTILITIES:
Selecting this function will enable the user to configure the OSD menu, define hot keys, verify BIOS Firmware version and miscellaneous operations.

USER SETTING: (Press "+" to access the sub-menu)

DPMS	: Disable / Enable the DPMS function.
DISPLAY INPUT	: Disable / Enable input source name upon power up.
AUTO SOURCE SELECT	: Off = Disable auto source select function. Low = Auto source select enabled ONLY in power up. High = Auto source select ALWAYS enabled.
GAMMA	: 1.0 / 1.6 / 2.2 - Adjusts gamma on TFT display.

OSD SETTING: (Press "+" to access the sub-menu)

OSD H-POSITION: Position the OSD menu horizontally.
OSD V-POSITION: Position the OSD menu vertically.

OSD BACKGROUND	: Choose between Translucent or Opaque.
OSD MENU ROTATE	: Choose between Normal / Rotate. Will position the menu either horizontally or vertically.
USER TIME OUT	: Adjust the OSD menu time out period in a step of 5 seconds.

FREEZE : Press "+" to freeze the display area, including PIP view.

ZOOM: (Press "+" to access the sub-menu)

ZOOM LEVEL: Zooms in the display area from center.
HORIZONTAL PAN: Pan the display area horizontally.
VERTICAL PAN: Pan the display area vertically.

DIRECT ACCESS 1 & 2: (Press "+" to access the sub-menu)
Define the hot key function ("+" or "-" front/under hatch buttons) to one of these OSD functions:
Brightness / Contrast / Volume / Freeze / Zoom / Video Source / PIP * / No Function / Test Pattern
** By pressing the assigned hot key, the sequence of the selected input video source are:*
Analog RGB / Component / Video / Composite Video / S-Video. (Note: Component Video is not implemented)

NOTE: *Direct Access 1 default setting is VOLUME*
NOTE: *Direct Access 2 default setting is NO FUNCTION*

DISPLAY ORIENTATION: (Press "+" to access the sub-menu)
Will flip/inverse the display area including PIP view. Press "+" to choose between:
Normal / Horizontal Inverse / Vertical Inverse / Inverse

CALIBRATE RGB GAIN : Color Calibration. Press "+" to automatically adjust it.

LOAD (FACTORY) DEFAULTS: (Press "+" to access the sub-menu. **NOTE: Only on newer models**)

LOAD USER DEFAULT	: Load your own personal custom settings.
SAVE USER DEFAULT	: Save your own personal custom settings.
LOAD FACTORY DEFAULT	: Will reset the VGA controller settings to the factory preset. Use caution when using this function, as this will override your current settings. (Does not affect USER DEFAULTS)

OSD Menu Functions

TEST PATTERN : Shows a generic test pattern.
(Introduced in the VGA BIOS Firmware V1.3x and up)

VIDEO SOURCE:
Selecting this function will enable the user to select the type of input signal to show fullscreen. Available inputs are: Analog RGB, Component Video*, Composite Video, S-Video and DVI. *(*Component Video is not implemented in our products.)*
Pressing “+” will activate the input, and pressing “-” will detect automatically.

VOLUME:
This function is not implemented in displays, and have no operational effect.

EXIT MENU:
Selecting this function will exit the OSD menu.
Press “+” to exit and save the current settings.

Note:
The OSD settings will also automatically be stored in memory when the OSD exit on user timeout.

Preset Signal Timings SXGA displays (NON-DVI)

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
E1_70	640x350	25.175	31.469	70	Digital Separate Sync
E1_70	640x350	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E1_70	640x350	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Digital Separate Sync
E1_85	640x350	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Composite Sync (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Digital Separate Sync
E2_70	640x400	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Digital Separate Sync
E2_85	640x400	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Composite Sync (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Digital Separate Sync
T_70	720x400	28.322	31.469	70	Sync On Green (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Composite Sync (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Digital Separate Sync
T_85	720x400	35.500	37.927	85	Sync On Green (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Composite Sync (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Digital Separate Sync
V_62	736x480	28.200	31.403	62	Sync On Green (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Composite Sync (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Digital Separate Sync
V_60	640x480	25.175	31.469	60	Sync On Green (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Composite Sync (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Digital Separate Sync
V_67	640x480	31.500	37.500	67	Sync On Green (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Composite Sync (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Digital Separate Sync
V_72	640x480	31.500	37.861	72	Sync On Green (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Composite Sync (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Digital Separate Sync
V_75	640x480	31.500	37.500	75	Sync On Green (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Composite Sync (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Digital Separate Sync
V_85	640x480	36.000	43.269	85	Sync On Green (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Composite Sync (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Digital Separate Sync
SV_56	800x600	36.000	35.156	56	Sync On Green (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Composite Sync (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Digital Separate Sync
SV_60	800x600	40.000	37.879	60	Sync On Green (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Composite Sync (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Digital Separate Sync
SV_72	800x600	50.000	48.077	72	Sync On Green (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Composite Sync (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Digital Separate Sync
SV_75	800x600	49.500	46.875	75	Sync On Green (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Composite Sync (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Digital Separate Sync
SV_85	800x600	56.250	53.674	85	Sync On Green (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Composite Sync (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Digital Separate Sync
X_60	1024x768	65.000	48.363	60	Sync On Green (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Composite Sync (with or without serrate pulse)

Preset Signal Timings SXGA displays (NON-DVI)

X_70	1024x768	75.000	56.476	70	Digital Separate Sync
X_70	1024x768	75.000	56.476	70	Sync On Green (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Composite Sync (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Digital Separate Sync
X_72	1024x768	75.000	57.515	72	Sync On Green (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Composite Sync (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Digital Separate Sync
X_75	1024x768	78.750	60.023	75	Sync On Green (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Composite Sync (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Digital Separate Sync
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Sync On Green (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Composite Sync (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Digital Separate Sync
X_85	1024x768	94.500	68.677	85	Sync On Green (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Composite Sync (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Digital Separate Sync
SX_60	1280x1024	108.000	63.981	60	Sync On Green (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Composite Sync (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Digital Separate Sync
SX_72	1280x1024	135.000	78.125	72	Sync On Green (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Composite Sync (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Digital Separate Sync
SX_75	1280x1024	135.000	79.976	75	Sync On Green (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Composite Sync (with or without serrate pulse)
SX_85	1280x1024	149.844	91.146	85	Digital Separate Sync
SX_85	1280x1024	149.844	91.146	85	Sync On Green (with or without serrate pulse)
SX_85	1280x1024	149.844	91.146	85	Composite Sync (with or without serrate pulse)
NTSC S_Video	---	14.318	15.734	60	---
PAL S-Video	---	17.75	15.625	50	---
NTSC Composite Video	---	14.318	15.734	60	---
PAL Composite Video	---	17.75	15.625	50	---

Preset Signal Timings SXGA displays (DVI)

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
E1_70	640x350	25.175	31.469	70	Digital Separate Sync
E1_70	640x350	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E1_70	640x350	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Digital Separate Sync
E1_85	640x350	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Composite Sync (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Digital Separate Sync
E2_70	640x400	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Digital Separate Sync
E2_85	640x400	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Composite Sync (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Digital Separate Sync
T_70	720x400	28.322	31.469	70	Sync On Green (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Composite Sync (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Digital Separate Sync
T_85	720x400	35.500	37.927	85	Sync On Green (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Composite Sync (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Digital Separate Sync
V_62	736x480	28.200	31.403	62	Sync On Green (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Composite Sync (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Digital Separate Sync
V_60	640x480	25.175	31.469	60	Sync On Green (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Composite Sync (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Digital Separate Sync
V_67	640x480	31.500	37.500	67	Sync On Green (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Composite Sync (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Digital Separate Sync
V_72	640x480	31.500	37.861	72	Sync On Green (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Composite Sync (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Digital Separate Sync
V_75	640x480	31.500	37.500	75	Sync On Green (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Composite Sync (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Digital Separate Sync
V_85	640x480	36.000	43.269	85	Sync On Green (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Composite Sync (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Digital Separate Sync
SV_56	800x600	36.000	35.156	56	Sync On Green (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Composite Sync (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Digital Separate Sync
SV_60	800x600	40.000	37.879	60	Sync On Green (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Composite Sync (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Digital Separate Sync
SV_72	800x600	50.000	48.077	72	Sync On Green (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Composite Sync (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Digital Separate Sync
SV_75	800x600	49.500	46.875	75	Sync On Green (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Composite Sync (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Digital Separate Sync
SV_85	800x600	56.250	53.674	85	Sync On Green (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Composite Sync (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Digital Separate Sync

Preset Signal Timings SXGA displays (DVI)

X_60	1024x768	65.000	48.363	60	Sync On Green (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Composite Sync (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Digital Separate Sync
X_70	1024x768	75.000	56.476	70	Sync On Green (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Composite Sync (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Digital Separate Sync
X_72	1024x768	75.000	57.515	72	Sync On Green (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Composite Sync (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Digital Separate Sync
X_75	1024x768	78.750	60.023	75	Sync On Green (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Composite Sync (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Digital Separate Sync
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Sync On Green (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Composite Sync (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Digital Separate Sync
X_85	1024x768	94.500	68.677	85	Sync On Green (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Composite Sync (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Digital Separate Sync
SX_60	1280x1024	108.000	63.981	60	Sync On Green (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Composite Sync (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Digital Separate Sync
SX_72	1280x1024	135.000	78.125	72	Sync On Green (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Composite Sync (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Digital Separate Sync
SX_75	1280x1024	135.000	79.976	75	Sync On Green (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Composite Sync (with or without serrate pulse)
NTSC S_Video	---	14.318	15.734	60	---
PAL S-Video	---	17.75	15.625	50	---
NTSC Composite Video	---	14.318	15.734	60	---
PAL Composite Video	---	17.75	15.625	50	---

Preset Signal Timings UXGA displays (NON-DVI)

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
E1_70	640x350	25.175	31.469	70	Digital Separate Sync
E1_70	640x350	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E1_70	640x350	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Digital Separate Sync
E1_85	640x350	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Composite Sync (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Digital Separate Sync
E2_70	640x400	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Digital Separate Sync
E2_85	640x400	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Composite Sync (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Digital Separate Sync
T_70	720x400	28.322	31.469	70	Sync On Green (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Composite Sync (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Digital Separate Sync
T_85	720x400	35.500	37.927	85	Sync On Green (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Composite Sync (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Digital Separate Sync
V_62	736x480	28.200	31.403	62	Sync On Green (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Composite Sync (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Digital Separate Sync
V_60	640x480	25.175	31.469	60	Sync On Green (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Composite Sync (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Digital Separate Sync
V_67	640x480	31.500	37.500	67	Sync On Green (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Composite Sync (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Digital Separate Sync
V_72	640x480	31.500	37.861	72	Sync On Green (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Composite Sync (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Digital Separate Sync
V_75	640x480	31.500	37.500	75	Sync On Green (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Composite Sync (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Digital Separate Sync
V_85	640x480	36.000	43.269	85	Sync On Green (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Composite Sync (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Digital Separate Sync
SV_56	800x600	36.000	35.156	56	Sync On Green (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Composite Sync (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Digital Separate Sync
SV_60	800x600	40.000	37.879	60	Sync On Green (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Composite Sync (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Digital Separate Sync
SV_72	800x600	50.000	48.077	72	Sync On Green (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Composite Sync (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Digital Separate Sync
SV_75	800x600	49.500	46.875	75	Sync On Green (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Composite Sync (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Digital Separate Sync
SV_85	800x600	56.250	53.674	85	Sync On Green (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Composite Sync (with or without serrate pulse)

Preset Signal Timings UXGA displays (NON-DVI)

X_60	1024x768	65.000	48.363	60	Digital Separate Sync
X_60	1024x768	65.000	48.363	60	Sync On Green (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Composite Sync (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Digital Separate Sync
X_70	1024x768	75.000	56.476	70	Sync On Green (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Composite Sync (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Digital Separate Sync
X_72	1024x768	75.000	57.515	72	Sync On Green (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Composite Sync (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Digital Separate Sync
X_75	1024x768	78.750	60.023	75	Sync On Green (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Composite Sync (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Digital Separate Sync
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Sync On Green (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Composite Sync (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Digital Separate Sync
X_85	1024x768	94.500	68.677	85	Sync On Green (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Composite Sync (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Digital Separate Sync
SX_60	1280x1024	108.000	63.981	60	Sync On Green (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Composite Sync (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Digital Separate Sync
SX_72	1280x1024	135.000	78.125	72	Sync On Green (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Composite Sync (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Digital Separate Sync
SX_75	1280x1024	135.000	79.976	75	Sync On Green (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Composite Sync (with or without serrate pulse)
UX_60	1600x1200	112.288	75.000	60	Digital Separate Sync
UX_60	1600x1200	112.288	75.000	60	Sync On Green (with or without serrate pulse)
UX_60	1600x1200	112.288	75.000	60	Composite Sync (with or without serrate pulse)
NTSC S_Video	---	14.318	15.734	60	---
PAL S-Video	---	17.75	15.625	50	---
NTSC Composite Video	---	14.318	15.734	60	---
PAL Composite Video	---	17.75	15.625	50	---

Preset Signal Timings UXGA displays (DVI)

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
E1_70	640x350	25.175	31.469	70	Digital Separate Sync
E1_70	640x350	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E1_70	640x350	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Digital Separate Sync
E1_85	640x350	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E1_85	640x350	31.500	37.861	85	Composite Sync (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Digital Separate Sync
E2_70	640x400	25.175	31.469	70	Sync On Green (with or without serrate pulse)
E2_70	640x400	25.175	31.469	70	Composite Sync (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Digital Separate Sync
E2_85	640x400	31.500	37.861	85	Sync On Green (with or without serrate pulse)
E2_85	640x400	31.500	37.861	85	Composite Sync (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Digital Separate Sync
T_70	720x400	28.322	31.469	70	Sync On Green (with or without serrate pulse)
T_70	720x400	28.322	31.469	70	Composite Sync (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Digital Separate Sync
T_85	720x400	35.500	37.927	85	Sync On Green (with or without serrate pulse)
T_85	720x400	35.500	37.927	85	Composite Sync (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Digital Separate Sync
V_62	736x480	28.200	31.403	62	Sync On Green (with or without serrate pulse)
V_62	736x480	28.200	31.403	62	Composite Sync (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Digital Separate Sync
V_60	640x480	25.175	31.469	60	Sync On Green (with or without serrate pulse)
V_60	640x480	25.175	31.469	60	Composite Sync (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Digital Separate Sync
V_67	640x480	31.500	37.500	67	Sync On Green (with or without serrate pulse)
V_67	640x480	31.500	37.500	67	Composite Sync (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Digital Separate Sync
V_72	640x480	31.500	37.861	72	Sync On Green (with or without serrate pulse)
V_72	640x480	31.500	37.861	72	Composite Sync (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Digital Separate Sync
V_75	640x480	31.500	37.500	75	Sync On Green (with or without serrate pulse)
V_75	640x480	31.500	37.500	75	Composite Sync (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Digital Separate Sync
V_85	640x480	36.000	43.269	85	Sync On Green (with or without serrate pulse)
V_85	640x480	36.000	43.269	85	Composite Sync (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Digital Separate Sync
SV_56	800x600	36.000	35.156	56	Sync On Green (with or without serrate pulse)
SV_56	800x600	36.000	35.156	56	Composite Sync (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Digital Separate Sync
SV_60	800x600	40.000	37.879	60	Sync On Green (with or without serrate pulse)
SV_60	800x600	40.000	37.879	60	Composite Sync (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Digital Separate Sync
SV_72	800x600	50.000	48.077	72	Sync On Green (with or without serrate pulse)
SV_72	800x600	50.000	48.077	72	Composite Sync (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Digital Separate Sync
SV_75	800x600	49.500	46.875	75	Sync On Green (with or without serrate pulse)
SV_75	800x600	49.500	46.875	75	Composite Sync (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Digital Separate Sync
SV_85	800x600	56.250	53.674	85	Sync On Green (with or without serrate pulse)
SV_85	800x600	56.250	53.674	85	Composite Sync (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Digital Separate Sync

Preset Signal Timings UXGA displays (DVI)

X_60	1024x768	65.000	48.363	60	Sync On Green (with or without serrate pulse)
X_60	1024x768	65.000	48.363	60	Composite Sync (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Digital Separate Sync
X_70	1024x768	75.000	56.476	70	Sync On Green (with or without serrate pulse)
X_70	1024x768	75.000	56.476	70	Composite Sync (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Digital Separate Sync
X_72	1024x768	75.000	57.515	72	Sync On Green (with or without serrate pulse)
X_72	1024x768	75.000	57.515	72	Composite Sync (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Digital Separate Sync
X_75	1024x768	78.750	60.023	75	Sync On Green (with or without serrate pulse)
X_75	1024x768	78.750	60.023	75	Composite Sync (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Digital Separate Sync
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Sync On Green (with or without serrate pulse)
X_87I	1024x768 43Hz Interaced	44.900	35.522	87	Composite Sync (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Digital Separate Sync
X_85	1024x768	94.500	68.677	85	Sync On Green (with or without serrate pulse)
X_85	1024x768	94.500	68.677	85	Composite Sync (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Digital Separate Sync
SX_60	1280x1024	108.000	63.981	60	Sync On Green (with or without serrate pulse)
SX_60	1280x1024	108.000	63.981	60	Composite Sync (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Digital Separate Sync
SX_72	1280x1024	135.000	78.125	72	Sync On Green (with or without serrate pulse)
SX_72	1280x1024	135.000	78.125	72	Composite Sync (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Digital Separate Sync
SX_75	1280x1024	135.000	79.976	75	Sync On Green (with or without serrate pulse)
SX_75	1280x1024	135.000	79.976	75	Composite Sync (with or without serrate pulse)
UX_60	1600x1200	112.288	75.000	60	Digital Separate Sync
UX_60	1600x1200	112.288	75.000	60	Sync On Green (with or without serrate pulse)
UX_60	1600x1200	112.288	75.000	60	Composite Sync (with or without serrate pulse)
NTSC S_Video	---	14.318	15.734	60	---
PAL S-Video	---	17.75	15.625	50	---
NTSC Composite Video	---	14.318	15.734	60	---
PAL Composite Video	---	17.75	15.625	50	---

User Controls
STD Products

Operation

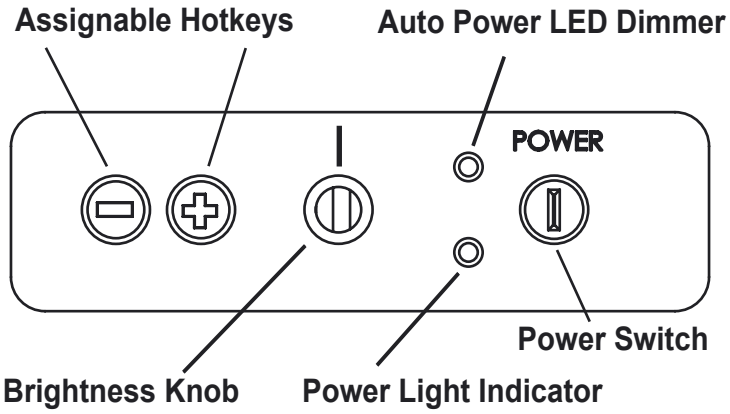
POWER SWITCH:

This TFT display features a Instant-ON/Delay-OFF switch, which ensures that the display is not turned off by user accident.

Power ON: To turn the display on, press down the power switch. The power light indicator will turn green.

(If no RGB signal sync is present, a message will appear in the display)

Power OFF: To turn the display off, press and hold the power switch down for 3 seconds.



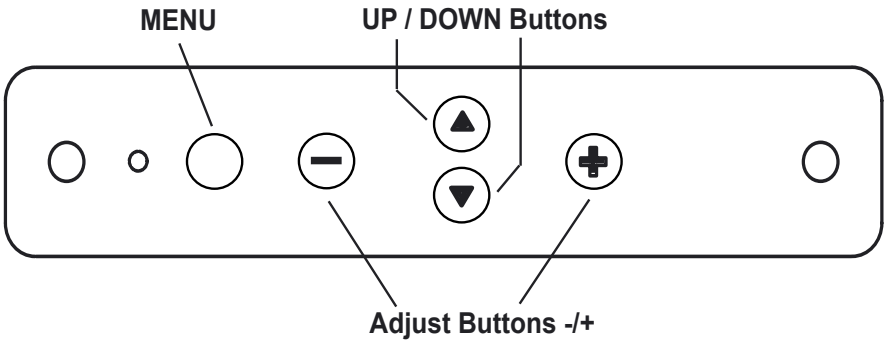
DISPLAY ADJUSTMENT CONTROLS:

This TFT display features a 100% dimmable image, which means it is capable of displaying a completely black image when the BRIGHTNESS knob is turned fully to the left.

ASSIGNABLE HOTKEYS:

The user can assign various display functions as hotkeys (increase/decrease).
This will enable the user to quickly adjust the brightness, image size, contrast or other functions to control the image. To assign these hotkeys, enter the **"EXTENDED MENU/DIRECT ACCESS"** menu and change them to the desired hotkey function. Default hotkeys are set to increase/decrease contrast.

User Controls / OSD Menu



USER CONTROLS:

1: Press the "**MENU**" button. The OSD Menu shows the functions menu.
2: To modify the values or access to its submenu, use the "**Adjust Buttons (-)** or **(+)**".
3: To select another function use the "**Select Buttons / Up** or **Down**" to navigate up or down.

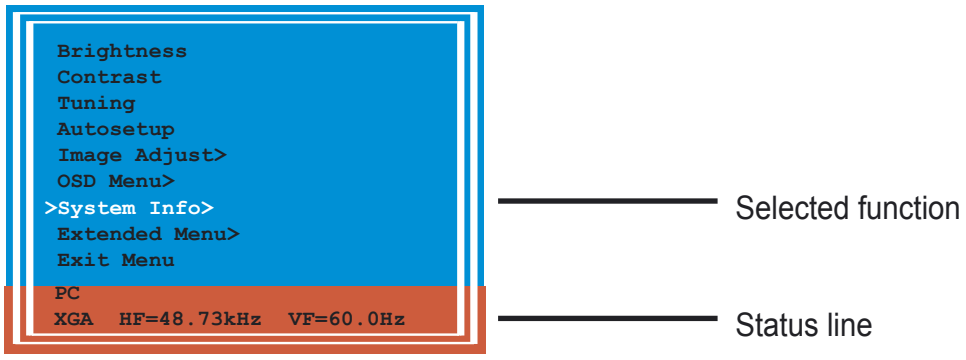
Note:
- The image quality depends on the computer or video card you are using.
- Select a crisp and bright image for display while adjustment takes place.
- The modified settings is automatically saved on menu exit. The user can also decide whenever to deactivate this function. This means the user has to save the settings manually by selecting the Exit Menu function and choosing save.

AVAILABLE FUNCTIONS:

The OSD Menu provides On Screen Display of certain common functions.

Pressing the "**MENU**" button will bring up the menu with it's available functions that can be adjusted. The selected function is highlighted. Often the selected function also have some quick information (status line) which is displayed in the bottom of the menu. The user can also use the "**MENU**" button to exit any menu or sub-menu.

To select another function, use the "**Select Buttons**" to navigate down/up on the menu. All modifications will instantly be updated on screen. Some of the menus also have sub-menus where you can modify more parameters, these are marked with an > arrow. They can be accessed by pressing the "**Adjust Button (+)**" button as the OSD Menu describes.



Above: Sample of OSD Menu

OSD Menu Functions

Brightness

Use this function to adjust the image brightness in relation to the background.
Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the value. The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 236

Contrast

Use this function to adjust the overall image and background screen brightness.
Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the value. The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 210

Tuning

Use this function to fine tune the data sampling position (adjust display quality).
Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the value. The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 31

Autosetup
Use this function to automatically set up the display area like positions, image size, tuning etc.
Pressing the "**Adjust Button (+)**" will activate auto setup.

Image Adjustments> (Sub-menu)
In this sub-menu the user can adjust the horizontal position, vertical position, horizontal size, sharpness and the 3 component **RGB (Red, Green, Blue)** color saturations of the display area.
Pressing the "**Adjust Button (+)**" will activate a new sub-menu which contains these functions:

- **Image Horizontal Position**

  Pressing the "**Adjust Buttons (-)** or **(+)**" will move the display area horizontally (left or right).
  The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 58

- **Image Vertical Position**

  Pressing the "**Adjust Buttons (-)** or **(+)**" will move the display area vertically (up or down).
  The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 56

- **Image Horizontal Size**

  Pressing the "**Adjust Buttons (-)** or **(+)**" will expand or shrink the display area from center horizontally.
  The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 1318 to 1358

- **Sharpness**

  Pressing the "**Adjust Buttons (-)** or **(+)**" will adjust the sharpness level of the display area.
  The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 3

continues on next page.....

OSD Menu Functions

....continued from previous page.

- **Red**

Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the red color level. The slider on screen will also move from left or right indicating the current setting and as a numerical value.
Range 0 to 35

- **Green**

Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the green color level. The slider on screen will also move from left or right indicating the current setting and as a numerical value.
Range 0 to 35

- **Blue**

Pressing the "**Adjust Buttons (-)** or **(+)**" will increase or decrease the blue color level. The slider on screen will also move from left or right indicating the current setting and as a numerical value.
Range 0 to 35

- **Reset RGB to default**
Pressing the "**Adjust Button (+)**" will reset any modifed **RGB** settings back to the previous setting before the user entered this sub-menu.

- **Back>**
Pressing the "**Adjust Button (+)**" or "**MENU**" will exit this sub-menu with the modified settings intact.

OSD Menu Functions

`OSD Menu>` (Sub-menu)
In this sub-menu the user can modify the horizontal position, vertical position, horizontal size, transparency, time out and auto save parameters for the OSD Menu itself.
Pressing the "**Adjust Button (+)**" will activate a new sub-menu which contains these functions:

- `Menu Hori Position`

Pressing the "**Adjust Buttons (-)** or **(+)**" will move the OSD Menu horizontally (left or right).
The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 62

- `Menu Vert Position`

Pressing the "**Adjust Buttons (-)** or **(+)**" will move the OSD Menu vertically (up or down).
The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 60

- `Transparency`

Pressing the "**Adjust Buttons (-)** or **(+)**" will adjust the OSD Menu transparent level in a stepwise manner. The slider on screen will also move from left or right indicating the current setting and as a numerical value. Range 0 to 3

- `Time Out`
Pressing the "**Adjust Buttons (-)** or **(+)**" will modify the timeout of the OSD Menu. The parameter selected will be highlighted. Values are in seconds before the OSD Menu will automatically disappear from the display area. Available parameters are: `10/20/30/45/60/cont`
Choosing `cont` (never auto exit) requires that the user manually exits the menu.

- `Auto Save`
Pressing the "**Adjust Buttons (-)** or **(+)**" will choose whenever the modified settings will be automatically saved when the OSD Menu exits. The parameter selected will be highlighted.

-When set to `Off` the user will manually have to save the modfied settings using the `Exit Menu` function and choosing save.

-When set to `On` all settings modified will automatically be saved when the user exist the menu, or the menu exits itself based on a timeout value.

- `Back>`
Pressing the "**Adjust Button (+)**" or "**MENU**" will exit this sub-menu with the modified settings intact.

OSD Menu Functions

`System Info>` (Sub-menu)
The status line will show some important technical information about the current display mode/controller:
Example:

```
PC
XGA   HF=48.73kHz   VF=60.0Hz
```

On this sub-menu the user can view various technical information for the internal graphics controller and the OSD Menu software. Pressing the "**Adjust Button (+)**" will activate a new sub-menu:

- `Display type`
  Shows the suggested display technology the user is running. Also detects what resolution the user is running on the display area. Example: `TFT LCD 1024x768`

- `Model and Serial No`
  Shows the internal graphic controller model and its serial number.* Example: `ACL-1024`
  * (Note: This is not the same as the display product serial number from Hatteland Display AS)

- `Bios version`
  Shows the BIOS version of the OSD Menu software. Example: `00.03-00.03`

- `Run time`
  Shows the uptime for the display itself. The user can reset this internal clock by pressing the "**Adjust Button (+)**" and hold it for 5 seconds.
  Example: `480h00m` (480 hours and 0 minutes)

- `Back>`
  Pressing the "**Adjust Button (+)**" or "**MENU**" will exit this sub-menu with the modified settings intact.

OSD Menu Functions

Extended Menu> (Sub-menu)
On this sub-menu the user can modify various OSD Menu parameters such as Direct Access (hot-keys) and language for all the OSD Menu and its submenus including any messages.
Pressing the "**Adjust Button (+)**" will activate a new sub-menu which contains these functions:

- **DOS Text or Graphics**
  Pressing the "**Adjust Buttons (-)** or **(+)**" will select between **Text** or **Graphics**
  The parameter selected will be highlighted. Leave this setting to **Graphics** for best results.

- **Direct Access 1>**
  Allow the user to define the hot-keys **(-) or (+)** / **Up** or **Down**) to one of the OSD functions.
  When the user presses one of the "**Adjust Buttons (-)** or **(+)**" or "**Select Buttons / Up** or **Down**" the assigned hot-key will increase / decrease the value without the user entering the OSD Menu itself.
  This can be very time consuming if the user has to modify any of the OSD functions quickly.
  Pressing the "**Adjust Button (+)**" will activate a new sub-menu which contains these functions:

  - **Brightness**
    Selecting this function will assign "**Brightness**" parameter changes to the "**Adjust Buttons (-)** or **(+)**" buttons.

  - **Contrast**
    Selecting this function will assign "**Contrast**" parameter changes to the "**Adjust Buttons (-)** or **(+)**" buttons.

  - **Back>**
    Pressing the "**Adjust Button (+)**" or "**MENU**" will exit the sub-menu one level with the modified settings intact and saved.

- **Direct Access 2>**
  The same procedure applies here as above on: **Direct Access 1>**
  The user can now assign the "**Select Buttons / Up** or **Down**" to the selected OSD function.

- **Language**
  Allow the user to configure the OSD Menu language for all the OSD Menu and its submenus including any messages. Pressing the "**Adjust Button (+)**" will activate a new sub-menu which enable the user to select the preferred language. The parameter selected will be highlighted.
  Available languages are: **English, Italian, Francais, Espanol, Svenska, Nederlands, Deutsche.**

- **Back>**
  Pressing the "**Adjust Button (+)**" or "**MENU**" will exit the language sub-menu with the modified settings intact and saved. Pressing it once more will also exit out to the main menu.

Exit Menu
Pressing the "**Adjust Button (+)**" will save the settings and exit the menu.
Pressing the "**Adjust Button (-)**" will exit the menu but does not save the modifed settings.

Preset Signal Timing XGA Displays

This TFT display is capable of detecting the following resolutions along with its preset signal timing setting. These settings have been pre-programmed by the RGB controller factory. The following industrial standard settings are supported for this display:

Mode	Resolution	Clk (MHz)	Horiz.Freq(KHz)	Vert.Freq(Hz)	Sync Gate
V_60	640 x 480	25.175	31.469	59.940	Digital Separate Sync.
SV_56	800 x 600	36.000	35.156	56.250	Digital Separate Sync.
SV_60	800 x 600	40.000	37.879	60.317	Digital Separate Sync.
X_60	1024 x 768	65.500	48.363	60.004	Digital Separate Sync.

Specifications

Specifications - JH 10T06 STD

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 10.4 inch viewable image size
- Active Matrix, Thin Film Transistor (TFT)
- RGB vertical stripe

TFT Characteristics:

- Pixel Number : 640 x 480
- Pixel Pitch (RGB) : 0.33 (H) x 0.33 (V) mm
- Response Time : 20 ms (typical), "black" to "white"
- Contrast Ratio : 300:1 (typical)
- Light Intensity : 350 cd/m2 (typical)
- Viewable Angle : +/- 70 deg. (H), 40 deg. (V)
- Active Display Area : 211.2 (H) x 158.4 (V) mm
- Max Colors : 262,144 colors (6-bit max)

Synchronisation:

Sync Signal:

- Separate synchronisation only
- Auto detects VGA, non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 48,3 kHz
- Vertical : 60 Hz *

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 * (Including 640 x 350)

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 10T06 STD A1
- 12-24 VDC : Model JH 10T06 STD A2

Power Consumption:

- Operating : 60 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 339 (W) 256 (H) 54 (D)
- Weight: 3,5 kg (approx)

Input Signal Terminal:

- RGB (PC) signal : 15pin mini D-SUB (female)
- AC Power signal : Std IEC Inlet Model JH 10T06 STD A1
- DC Power signal : Screw terminal Model JH 10T06 STD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- Mode Status LED
- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C . This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH 10TBR = Bracket *
- JH XXTRO STD = Bracket *
- JH 10TSV = Sun Visor *
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

Specifications - JH 10T06 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 10.4 inch viewable image size
- Active Matrix, Thin Film Transistor (TFT)
- RGB vertical stripe

TFT Characteristics:

- Pixel Number : 640 x 480
- Pixel Pitch (RGB) : 0.33 (H) x 0.33 (V) mm
- Response Time : 20 ms (typical), "black" to "white"
- Contrast Ratio : 300:1 (typical)
- Light Intensity : 350 cd/m2 (typical)
- Viewable Angle : +/- 70 deg. (H), 40 deg. (V)
- Active Display Area : 211.2 (H) x 158.4 (V) mm
- Max Colors : 262,144 colors (6-bit max)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 91,1 kHz
- Vertical : 60 Hz to 85 Hz

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 10T06 MMD A1
- 24 VDC : Model JH 10T06 MMD A2

Power Consumption:

- Operating : 60 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 339 (W) 256 (H) 54 (D)
- Weight: 3,5 kg (approx)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 10T06 MMD A1
- DC Power signal : Screw terminal Model JH 10T06 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- Mode Status LED
- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C . This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH 10TBR = Bracket *
- JH XXTRO STD = Bracket *
- JH 10TSV = Sun Visor *
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

Specifications - JH 15T05 STD

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 15.0 inch viewable image size
- Color Active Matrix LCD Module
- a-Si Thin Film Transistor (TFT)

TFT Characteristics:

- Pixel number : 1024 x 768
- Pixel pitch (RGB) : 0.297 (H) x 0.297 (V) mm
- Response Time : 25 ms (typical), "black" to "white"
- Contrast Ratio : 400:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 304.1 (H) x 228.1 (V) mm
- Max Colors : 16.7 millions

Synchronisation:

Sync Signal:

- Separate synchronisation only
- Auto detects VGA -> XGA, non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 48,3 kHz
- Vertical : 60 Hz *

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480
- SVGA : 800 x 600
- XGA : 1024 x 768 *

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz or 230VAC/50Hz : Model JH 15T05 STD A1
- 12-24 VDC : Model JH 15T05 STD A2

Power Consumption:

- Operating : 40 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 412 (W) 345 (H) 58 (D)
- Weight: 7 kg (approx w/bracket)

Input Signal Terminal:

- RGB (PC) signal : 15pin mini D-SUB (female)
- AC Power signal : Std IEC Inlet Model JH 15T05 STD A1
- DC Power signal : Screw terminal Model JH 15T05 STD A2

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 20% to 85% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 5% to 85% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH 15TBR = Bracket *
- JH 15TRO = Rotary Bracket *
- JH 15TSV = Sun Visor *

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

Specifications - JH 15T05 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 15.0 inch viewable image size
- Color Active Matrix LCD Module
- a-Si Thin Film Transistor (TFT)

TFT Characteristics:

- Pixel number : 1024 x 768
- Pixel pitch (RGB) : 0.297 (H) x 0.297 (V) mm
- Response Time : 25 ms (typical), "black" to "white"
- Contrast Ratio : 400:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 304.1 (H) x 228.1 (V) mm
- Max Colors : 16.7 millions

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> SXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 91,1 kHz
- Vertical : 60 Hz * to 85 Hz

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768 *

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz or 230VAC/50Hz : Model JH 15T05 MMD A1
- 12-24 VDC : Model JH 15T05 MMD A2

Power Consumption:

- Operating : 40 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 412 (W) 345 (H) 58 (D)
- Weight: 7 kg (approx w/bracket)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 15T05 MMD A1
- DC Power signal : Screw terminal Model JH 15T05 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +50 deg. C
  Humidity 20% to 85% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 5% to 85% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH 15TBR = Bracket *
- JH 15TRO = Rotary Bracket *
- JH 15TSV = Sun Visor *
- JH XPR = External Power Relay
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

Specifications - JH 17T01 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 17.4 inch viewable image size
- Thin Film Transistor (TFT)
- MVA Technology

TFT Characteristics:

- Pixel Number : 1280 x 1024
- Pixel Pitch (RGB) : 0.27 (H) x 0.27 (V) mm
- Response Time : 25 ms (typical), "black" to "white"
- Contrast Ratio : 400:1 (typical)
- Light Intensity : 220 cd/m2 (typical)
- Viewable Angle : +/- 80 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 345.6 (H) x 276.48 (V) mm
- Max Colors : 16.7 millions (depending on graphics card)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> SXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 91,1 kHz
- Vertical : 60 Hz * to 85 Hz

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024 *

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz or 230VAC/50Hz : Model JH 17T01 MMD A1
- 24 VDC : Model JH 17T01 MMD A2

Power Consumption:

- Operating : 60 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 460 (W) 400 (H) 57 (D)
- Weight: 9.2 kg (approx w/bracket)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 17T01 MMD A1
- DC Power signal : Screw terminal Model JH 17T01 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C . This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH MMD BR = Bracket *
- JH MMDRO = Rotary Bracket *
- JH 17TSV = Sun Visor *
- JH VESA 17T01 = Vesa Bracket *
- JH VBUF = Video Buffer **(1)**
- JH SCOM = Remote Control
- JH XPR = External Power Relay
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

(1) The JHVBUF is tested at resolutions up to 1600 x 1200. Both separate sync and composite sync is supported. The VGA output signal is at same resolution and sync as the input. The output is working even if the main display is turned off. (Power supply must be connected though)

Specifications - JH 19T02 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 19.0 inch viewable image size
- Active Matrix, Thin Film Transistor (TFT)
- MVA Premium™ Technology

TFT Characteristics:

- Pixel Number : 1280 x 1024
- Pixel Pitch (RGB) : 0.294 (H) x 0.294 (V) mm
- Response Time : 15 ms (typical), "black" to "white"
- Contrast Ratio : 700:1 (typical)
- Light Intensity : 300 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 376.32 (H) x 301.056 (V) mm
- Max Colors : 16.7 millions (depending on graphics card)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> SXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 91,1 kHz
- Vertical : 60 Hz * to 85 Hz

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024 *

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 19T02 MMD A1
- 24 VDC : Model JH 19T02 MMD A2

Power Consumption:

- Operating : 100 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 483 (W) 444 (H) 68 (D)
- Weight: 12 kg (approx w/bracket)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 19T02 MMD A1
- DC Power signal : Screw terminal Model JH 19T02 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH MMD BR = Bracket *
- JH MMDRO = Rotary Bracket *
- JH 19TSV = Sun Visor *
- JH VESA 18T04 = Vesa Bracket *
- JH VBUF = Video Buffer **(1)**
- JH SCOM = Remote Control
- JH XPR = External Power Relay
- ECDIS Version = JH 19T02 MMD E1/E2 (E1=AC / E2=DC)
- ECDIS w/buzzer= JH 19T02 MMD E11/E12 (E11=AC / E12=DC)
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

(1) The JHVBUF is tested at resolutions up to 1600 x 1200. Both separate sync and composite sync is supported. The VGA output signal is at same resolution and sync as the input. The output is working even if the main display is turned off. (Power supply must be connected though)

Specifications - JH 20T03 MMD (NON-DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 20.1 inch viewable image size
- Active Matrix
- Thin Film Transistor (Super-TFT)

TFT Characteristics:

- Pixel Number : 1280 x 1024
- Pixel Pitch (RGB) : 0.312 (H) x 0.312 (V) mm
- Response Time : 25 ms (typical), "black" to "white"
- Contrast Ratio : 300:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 399.36 (H) x 319.49 (V) mm
- Max Colors : 16.7 millions (depending on graphics card)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> SXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31,5 kHz to 91,1 kHz
- Vertical : 60 Hz * to 85 Hz

** Recommended for optimum picture quality*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024 *

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 20T03 MMD A1
- 24 VDC : Model JH 20T03 MMD A2

Power Consumption:

- Operating : 100 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 534 (W) 481 (H) 79.50 (D)
- Weight: 14 kg (approx w/bracket)

Input Signal Terminal:

- RGB (PC) signal : 15pin mini D-SUB (female)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 20T03 MMD A1
- DC Power signal : Screw terminal Model JH 20T03 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C . This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH MMD BR = Bracket *
- JH MMDRO = Rotary Bracket *
- JH 20TSV = Sun Visor *
- JH VESA 20T03 = Vesa Bracket *
- JH VBUF = Video Buffer **(1)**
- JH SCOM = Remote Control
- JH XPR = External Power Relay
- ECDIS Version = JH 20T03 MMD E1
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

(1) The JHVBUF is tested at resolutions up to 1600 x 1200. Both separate sync and composite sync is supported. The VGA output signal is at same resolution and sync as the input. The output is working even if the main display is turned off. (Power supply must be connected though)

Specifications - JH 20T05 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 20.1 inch viewable image size
- Active Matrix, Thin Film Transistor (TFT)
- MVA Premium™ technology

TFT Characteristics:

- Pixel Number : 1600 x 1200
- Pixel Pitch (RGB) : 0.255 (H) x 0.255 (V) mm
- Response Time : 15 ms (typical), "black" to "white"
- Contrast Ratio : 600:1 (typical)
- Light Intensity : 300 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 408.0 (H) x 306.0 (V) mm
- Max Colors : 16.7 millions (depending on graphics card)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> UXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31.469 kHz to 75 kHz
- Vertical : 56 Hz* to 75 Hz

** Recommended 60Hz for optimum picture quality. 56 Hz only in 800x600*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024
- UXGA : 1600 x 1200*

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality. (60 Hz only)*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 20T05 MMD A1
- 24 VDC : Model JH 20T05 MMD A2

Power Consumption:

- Operating : 100 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 534 (W) 481 (H) 73 (D)
- Weight: 15 kg (approx w/bracket)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 20T05 MMD A1
- DC Power signal : Screw terminal Model JH 20T05 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Available Options:

- JH MMD BR = Bracket *
- JH MMDRO = Rotary Bracket *
- JH 20TSV = Sun Visor *
- JH VESA 20T03 = Vesa Bracket *
- JH VBUF = Video Buffer **(1)**
- JH SCOM = Remote Control
- JH XPR = External Power Relay
- ECDIS Version = JH 20T05 MMD E1/E2 (E1=AC / E2=DC)
- ECDIS w/buzzer= JH 20T05 MMD E11/E12 (E11=AC / E12=DC)
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

(1) The JHVBUF is tested at resolutions up to 1600 x 1200. Both separate sync and composite sync is supported. The VGA output signal is at same resolution and sync as the input. The output is working even if the main display is turned off. (Power supply must be connected though)

Specifications - JH 23T02 MMD (DVI)

Note: All specifications are subject to change without prior notice!

TECHNICAL DESCRIPTION

TFT Technology:

- 23.1 inch viewable image size
- Thin Film Transistor (TFT)
- MVA Premium™ technology

TFT Characteristics:

- Pixel Number : 1600 x 1200
- Pixel Pitch (RGB) : 0.294 (H) x 0.294 (V) mm
- Response Time : 20 ms (typical), "black" to "white"
- Contrast Ratio : 600:1 (typical)
- Light Intensity : 250 cd/m2 (typical)
- Viewable Angle : +/- 85 deg. (typical) (Up/Down/Left/Right)
  : (@ CR > 10)
- Active Display Area : 470.4 (H) x 352.8 (V) mm
- Max Colors : 16.7 millions (depending on graphics card)

Synchronisation:

Sync Signal:

- Digital separate synchronisation
- Composite synchronisation
- Synchronisation on green.
- Auto detects VGA -> UXGA, interlaced and non interlaced
- Video Signal : Analog RGB 0,7Vp-p
  : Input Impedance 75 Ohm

Synchronisation Range:

- Horizontal : 31.469 kHz to 75 kHz
- Vertical : 56 Hz* to 75 Hz

** Recommended 60Hz for optimum picture quality. 56 Hz only in 800x600*

Supported Signal Inputs:

Resolutions:

- VGA : 640 x 480 (including 640 x 350)
- SVGA : 800 x 600 (including 720 x 400)
- XGA : 1024 x 768
- SXGA : 1280 x 1024
- UXGA : 1600 x 1200*

Video Signals:

- Interlaced NTSC and PAL/SECAM video
- Composite video
- S-Video

** Recommended for optimum picture quality. (60 Hz only)*

Power Specifications:

Power Supply Options:

- 115VAC/60Hz & 230VAC/50Hz : Model JH 23T02 MMD A1
- 24 VDC : Model JH 23T02 MMD A2

Power Consumption:

- Operating : 100 W (max)

MECHANICAL DESCRIPTION

Physical Dimensions:

- 584 (W) 534 (H) 72 (D)
- Weight: 17 kg (approx w/bracket)

Input Signal Terminal:

- DVI-D (PC) signal : DVI-D Input 24pin Connector
- RGB (PC) signal : 15pin mini D-SUB (female - Input)
- Composite Video : RCA Phono plug
- S-Video signal : S-Video (SVHS) plug
- AC Power signal : Std IEC Inlet Model JH 23T02 MMD A1
- DC Power signal : Screw terminal Model JH 23T02 MMD A2

Accessories:

- Touchscreen : 1 x D-SUB 9P Connector (female)
- Remote Control : 2 x D-SUB 9P Connectors (female)

User Controls:

On front bezel:

- Power On/Off (push button)
- Brightness Control
- 2 x hotkeys
- Mode Status LED

Behind hatch:

- On Screen Display control (OSD/OSM)

Environmental Considerations:

- Operating : Temperature -15 deg. C to +55 deg. C
  Humidity 30% to 90% (non condensing)
- Storage : Temperature -20 deg. C to +60 deg. C
  Humidity 10% to 90% (non condensing)

Safety Considerations:

Even although the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Available Options:

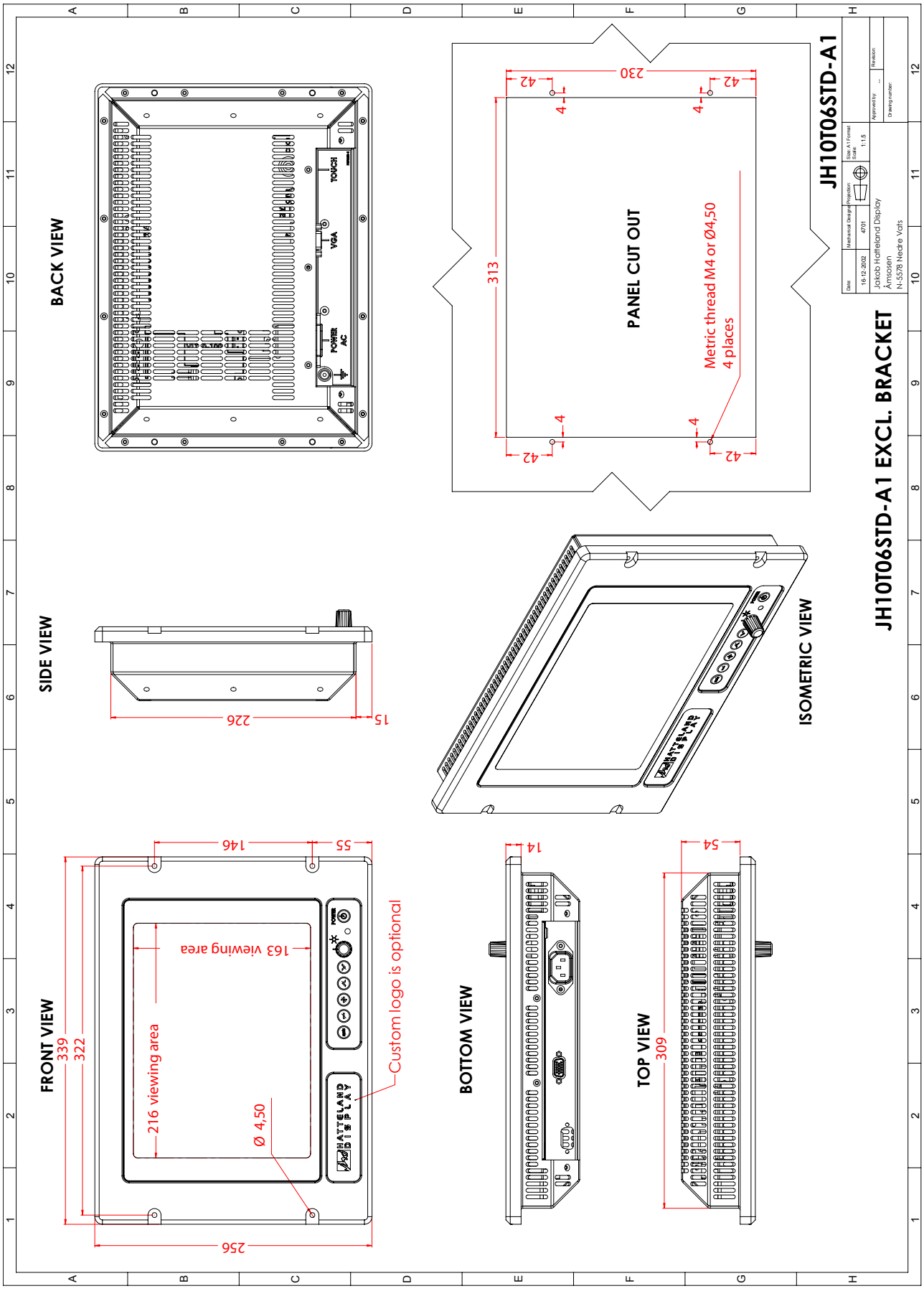
- JH MMD BR = Bracket *
- JH MMDRO = Rotary Bracket *
- JH 23TSV = Sun Visor *
- JH VESA 23T01 = Vesa Bracket *
- JH VBUF = Video Buffer **(1)**
- JH SCOM = Remote Control
- JH XPR = External Power Relay
- ECDIS Version = JH 23T02 MMD E1/E2 (E1=AC / E2=DC)
- ECDIS w/buzzer= JH 23T02 MMD E11/E12 (E11=AC / E12=DC)
- Touch Screen = Factory mounted

**Option: Standard or custom logo and color*
**Option: See separate datasheet for specifications on bracket options.*

(1) The JHVBUF is tested at resolutions up to 1600 x 1200. Both separate sync and composite sync is supported. The VGA output signal is at same resolution and sync as the input. The output is working even if the main display is turned off. (Power supply must be connected though)

Technical Drawings

Technical Drawings - JH 10T06 STD



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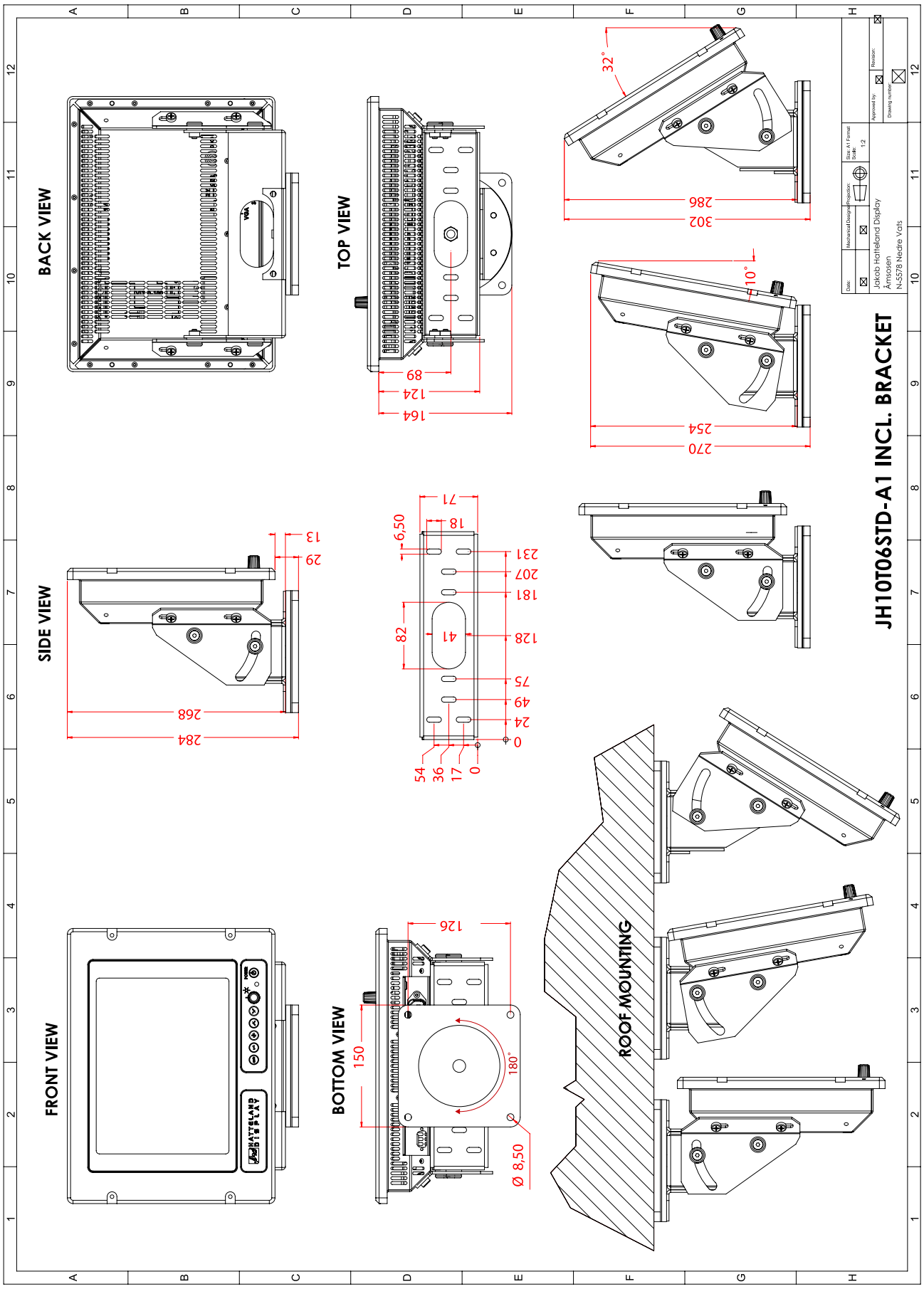
Technical Drawings - JH 10T06 STD



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Technical drawings (.DWG format) are found on our internet site: http://www.hatteland.com

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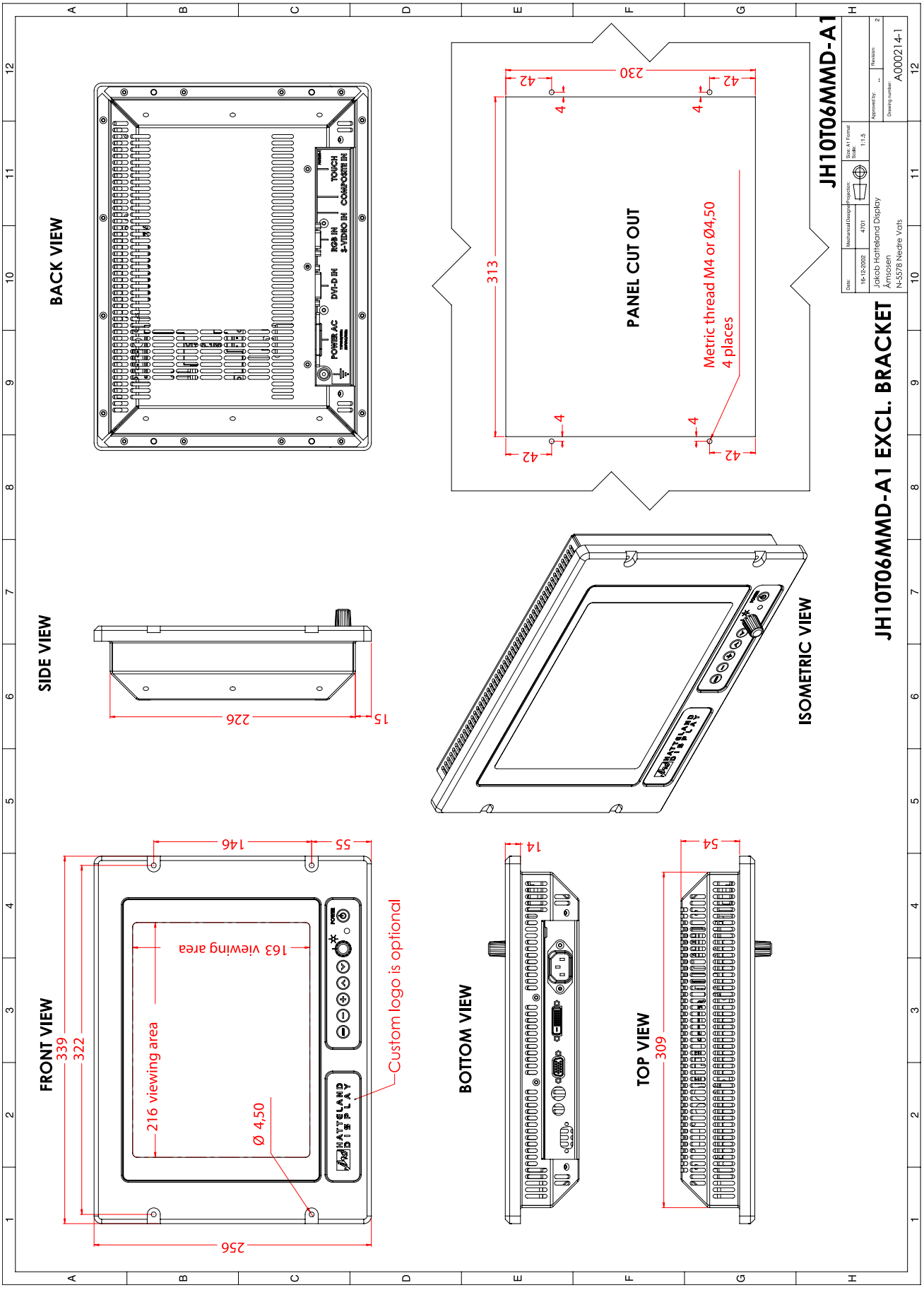
Technical Drawings - JH 10T06 MMD (DVI)



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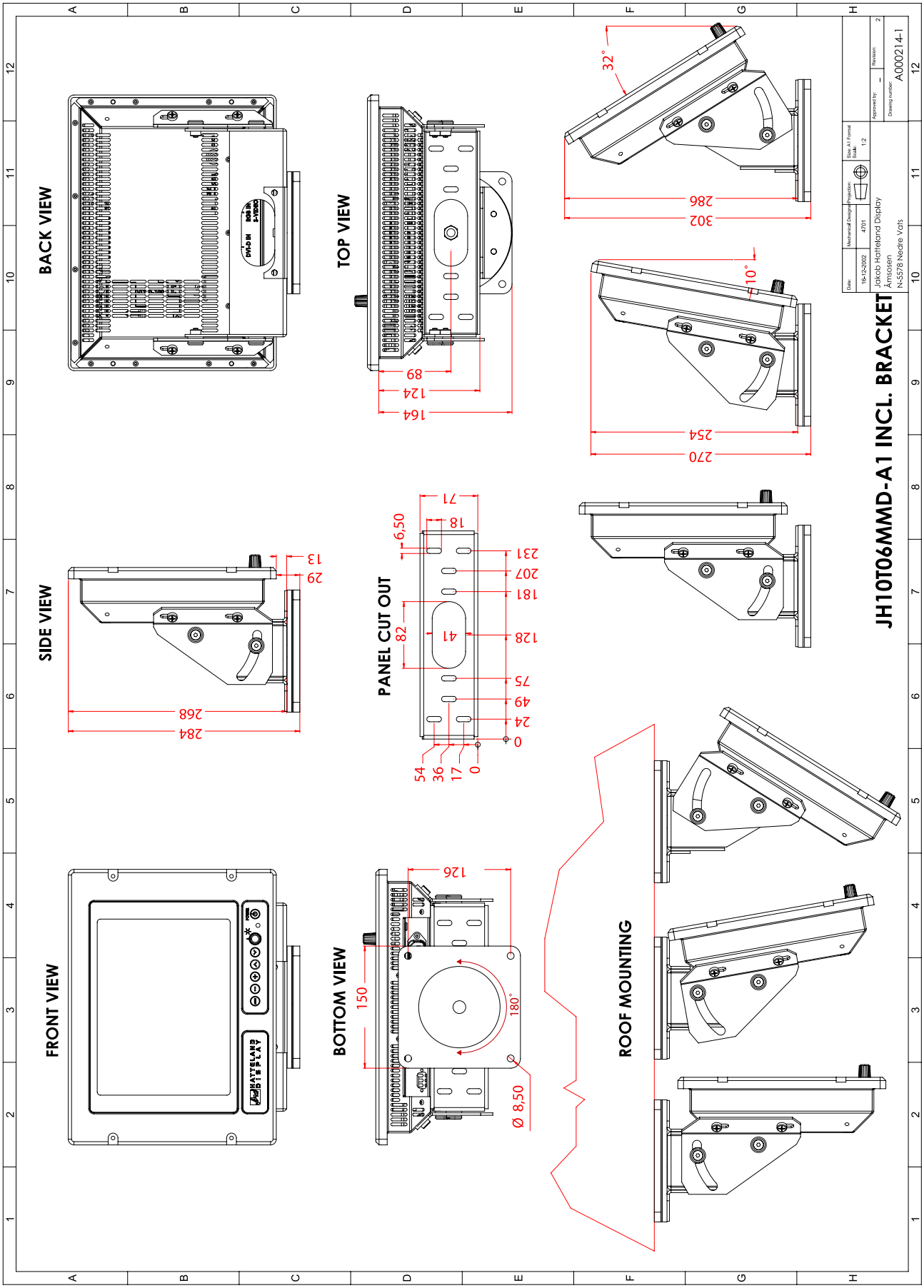
Technical Drawings - JH 10T06 MMD (DVI)



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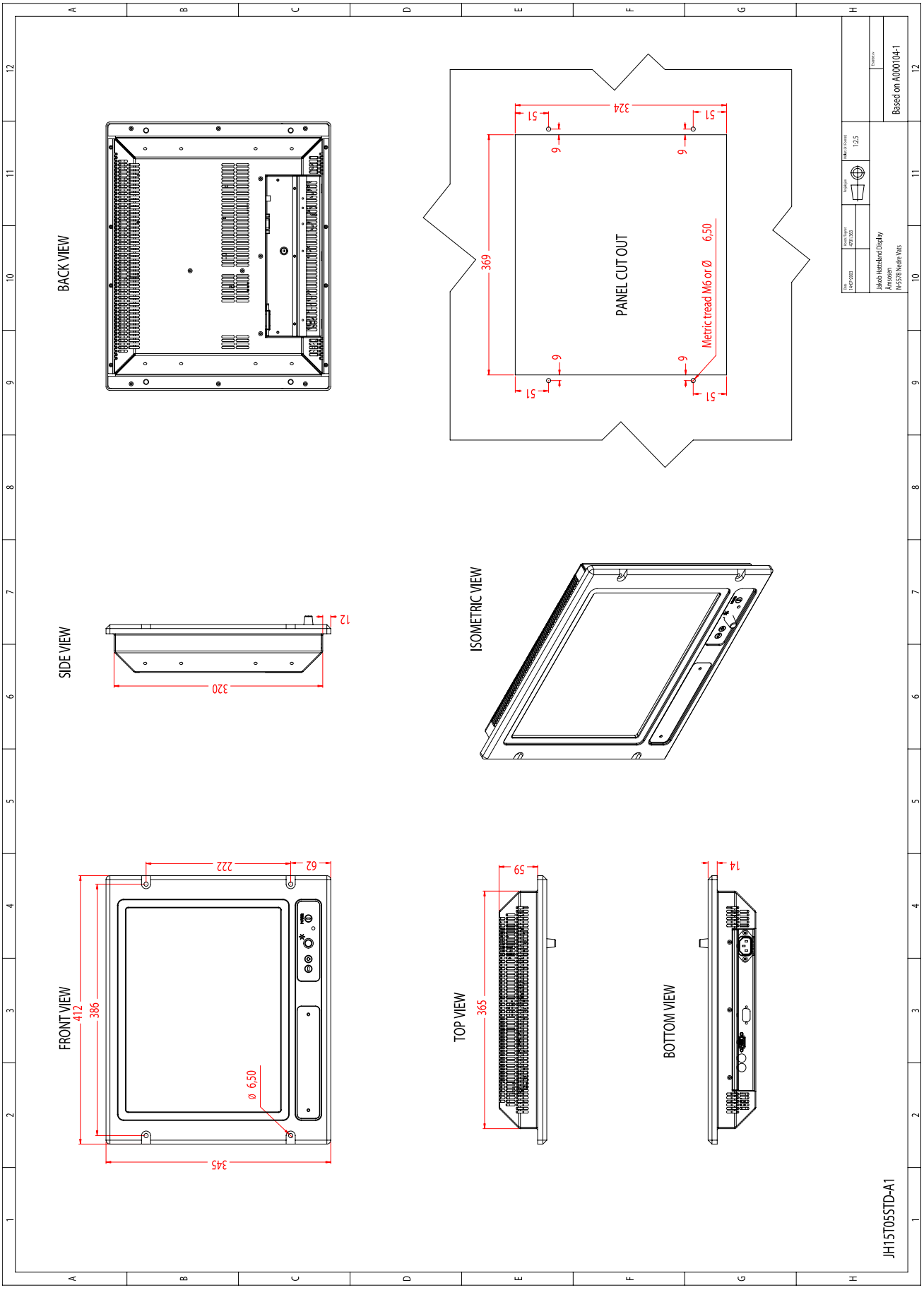
Technical Drawings - JH 15T05 STD



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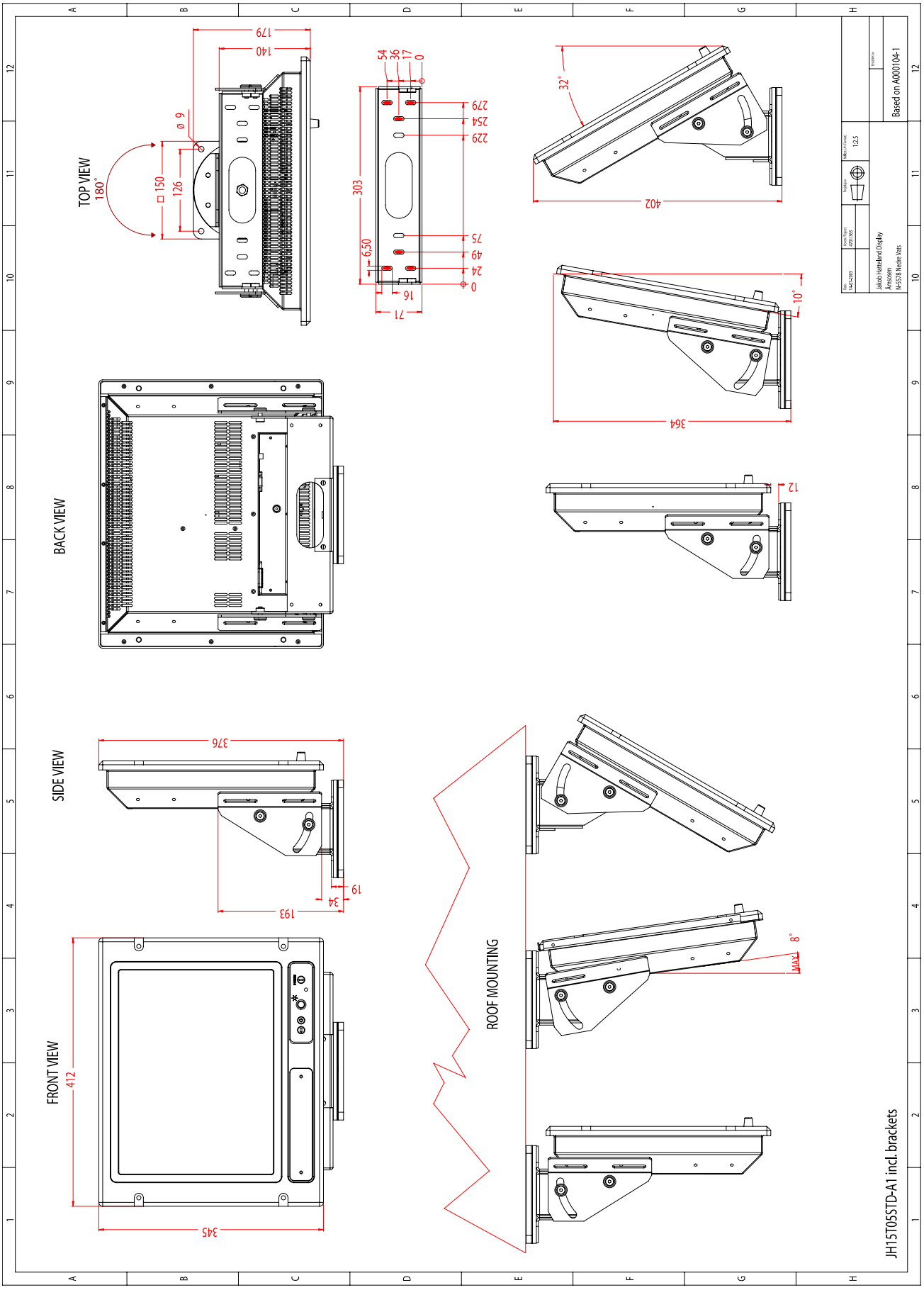
Technical Drawings - JH 15T05 STD



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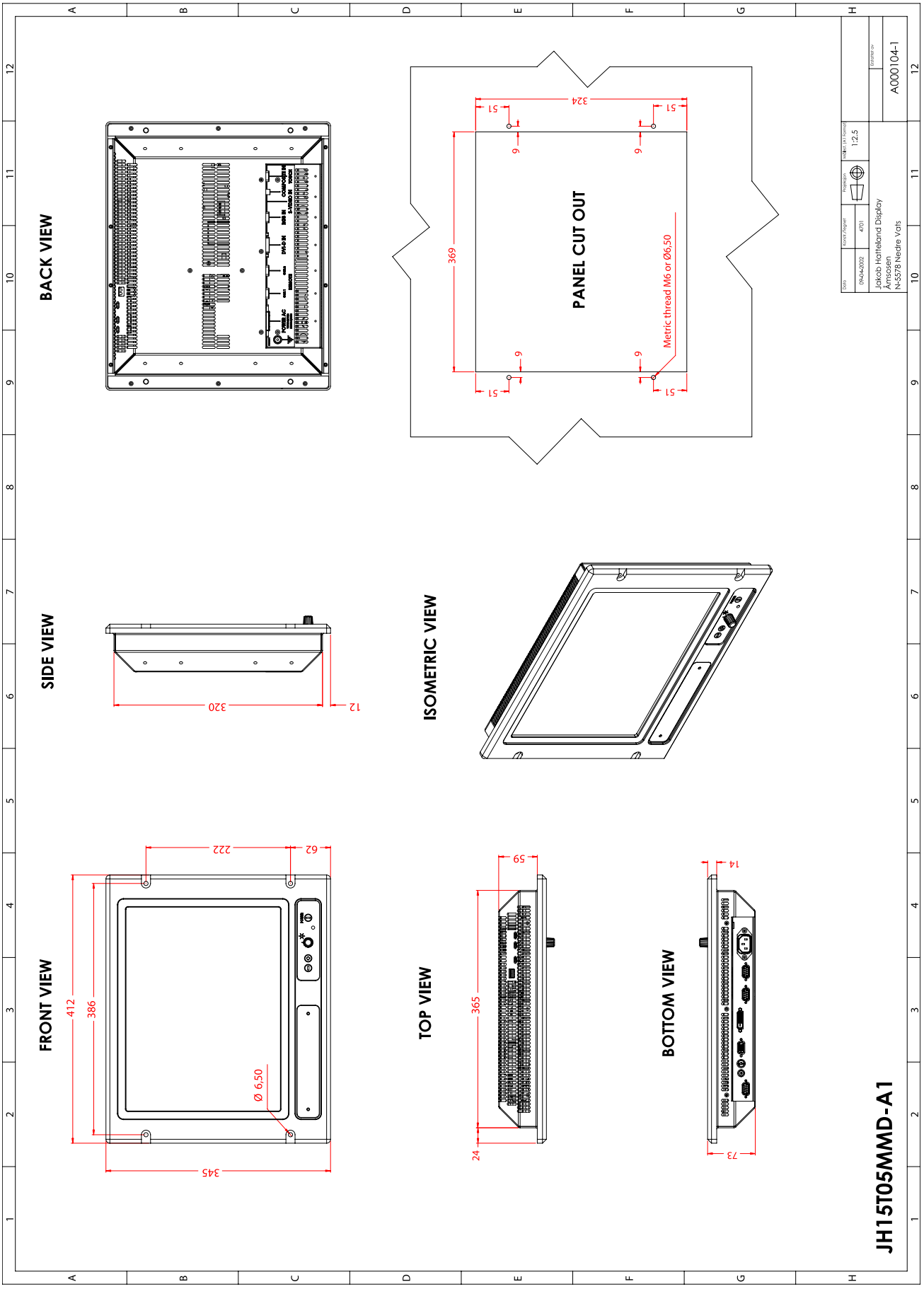
Technical Drawings - JH 15T05 MMD (DVI)



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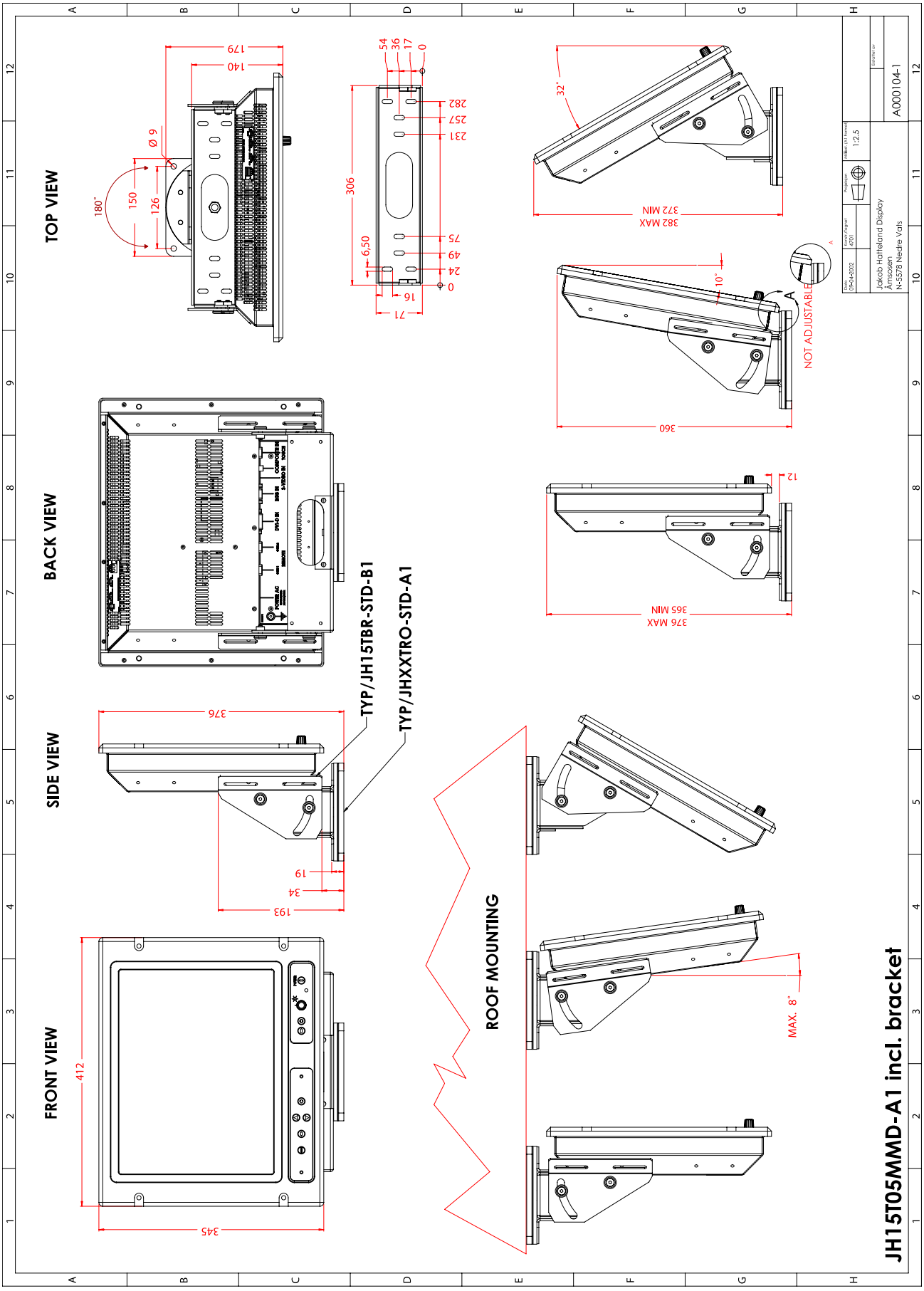
Technical Drawings - JH 15T05 MMD (DVI)



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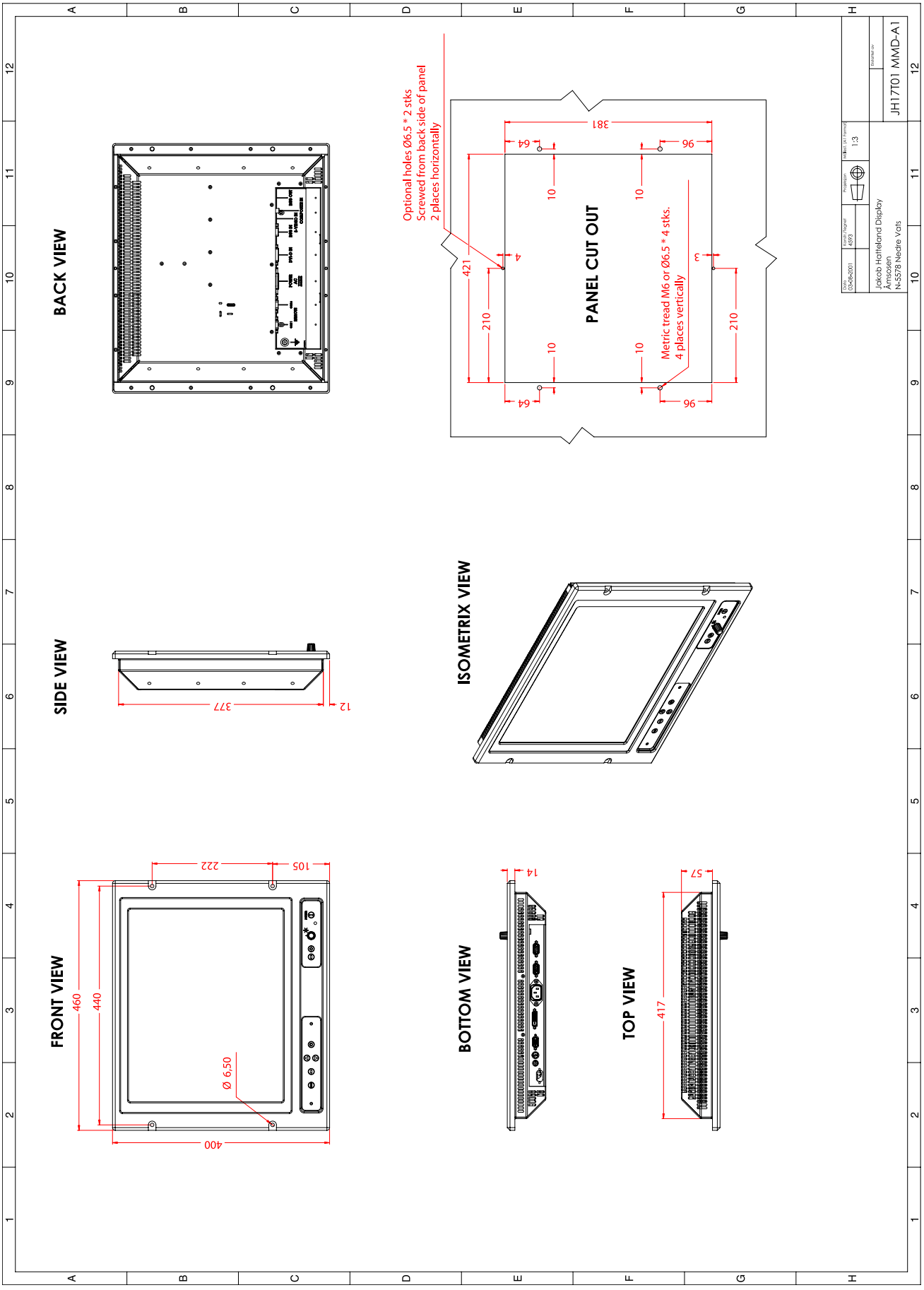
Technical Drawings - JH 17T01 MMD (DVI)



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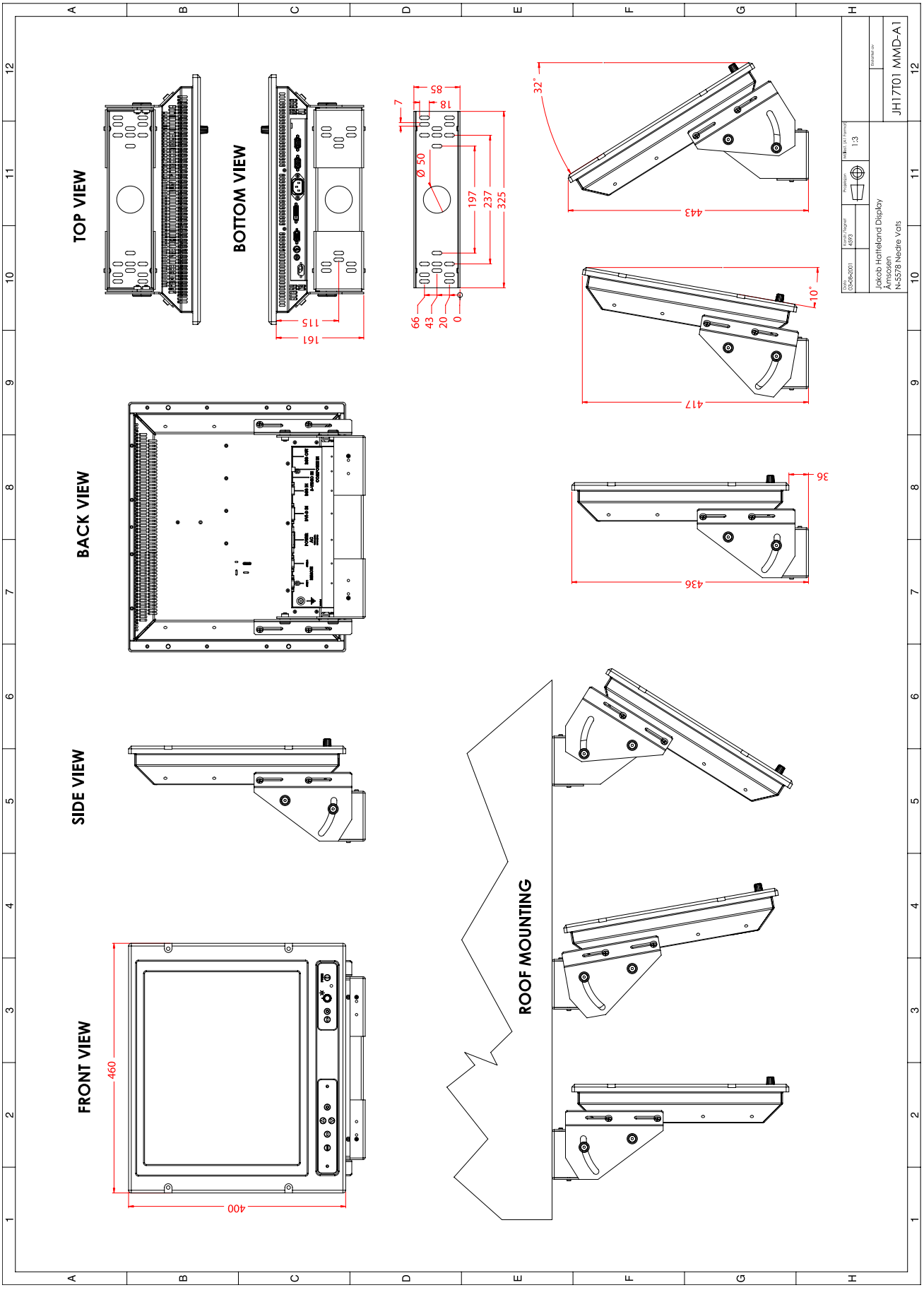
Technical Drawings - JH 17T01 MMD (DVI)



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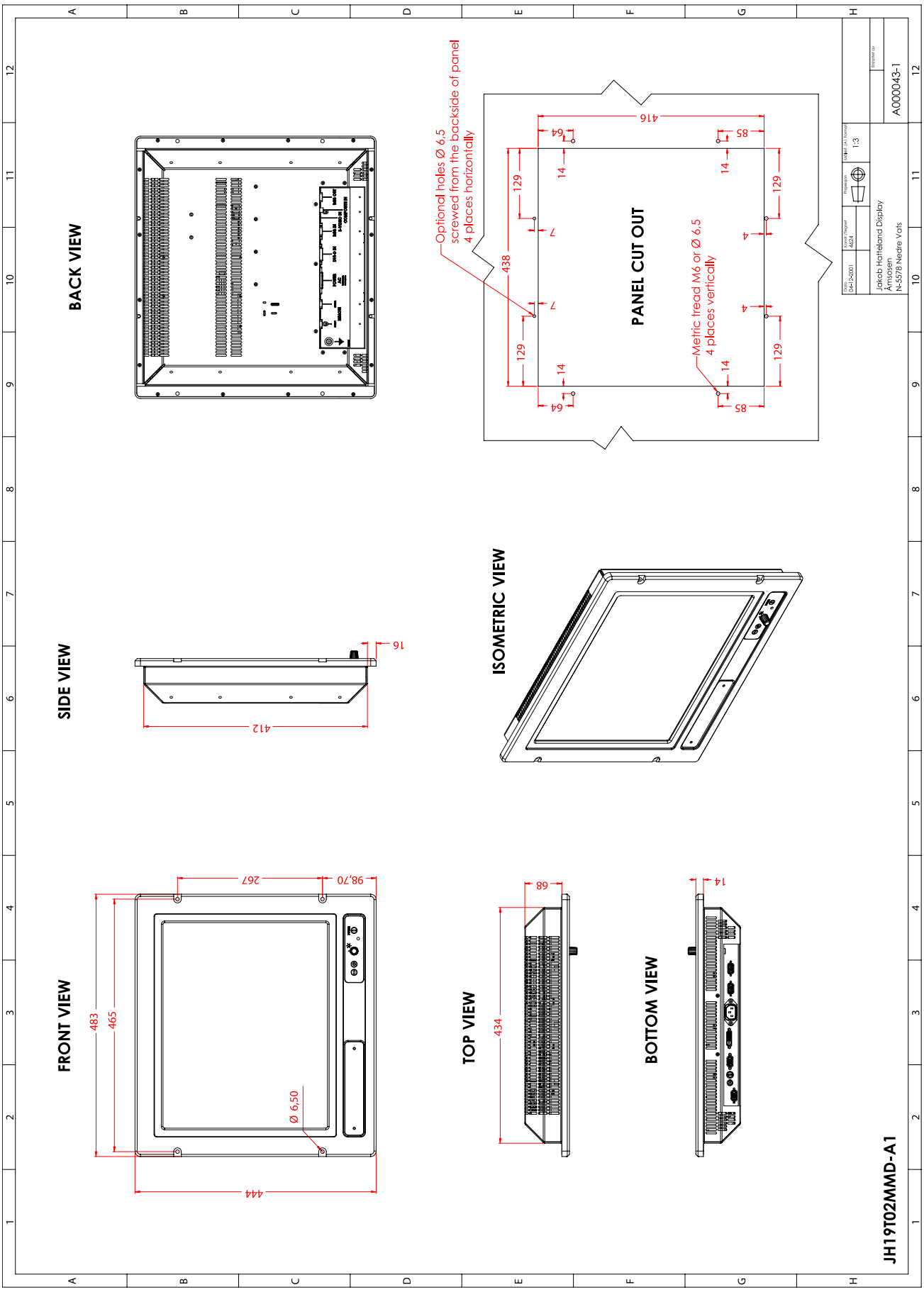
Technical Drawings - JH 19T02 MMD (DVI)



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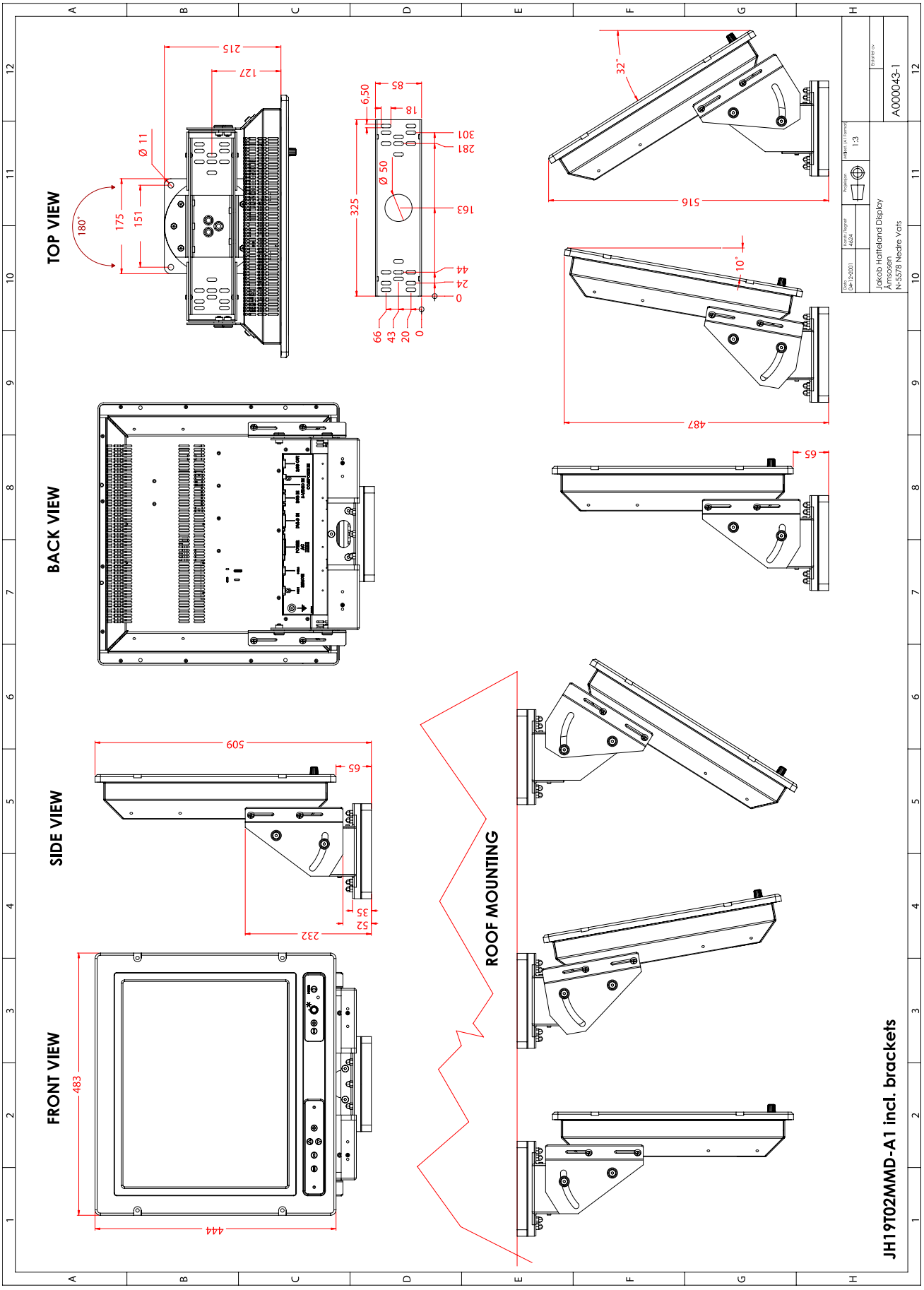
Technical Drawings - JH 19T02 MMD (DVI)



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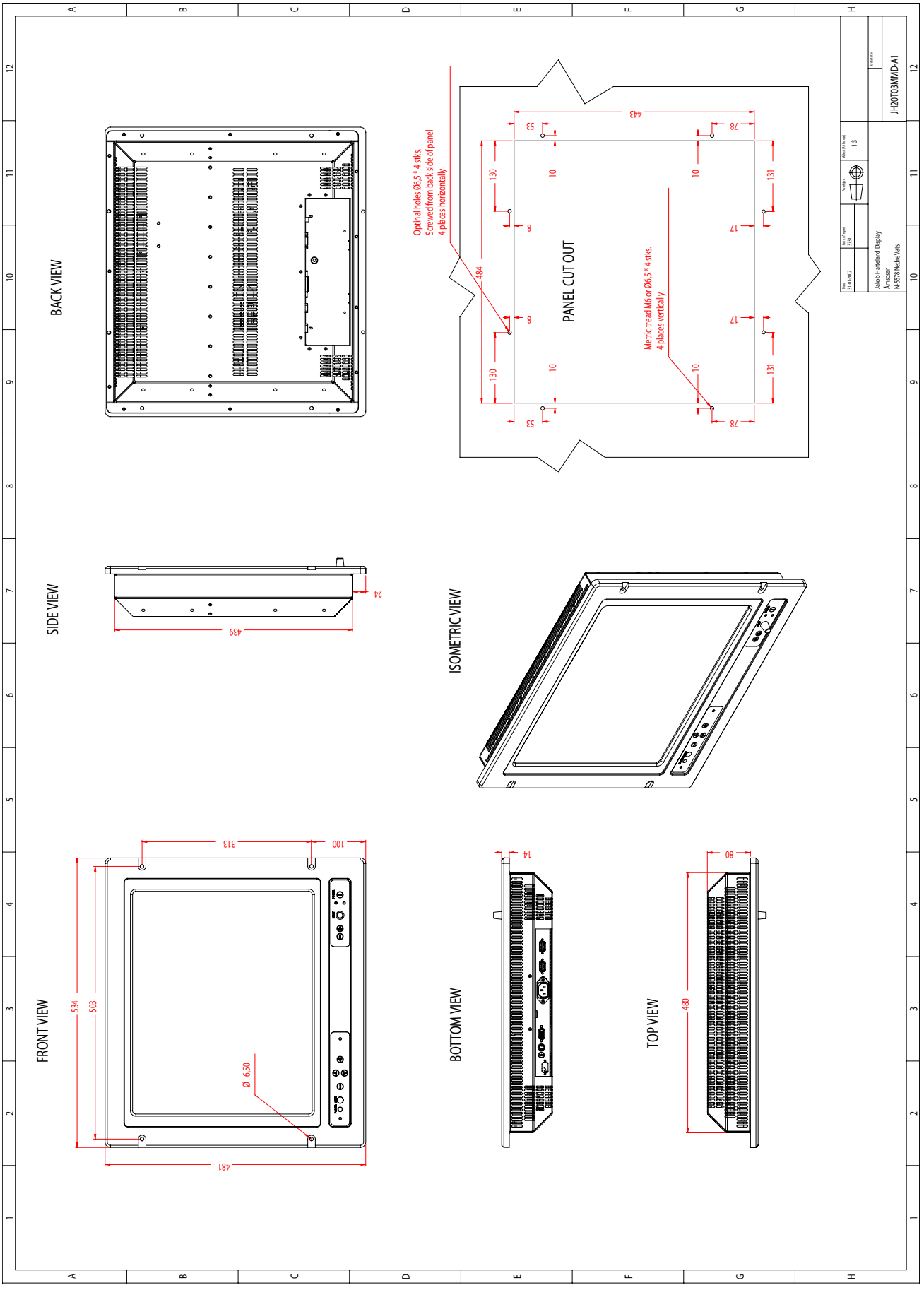
Technical Drawings - JH 20T03 MMD (NON-DVI)



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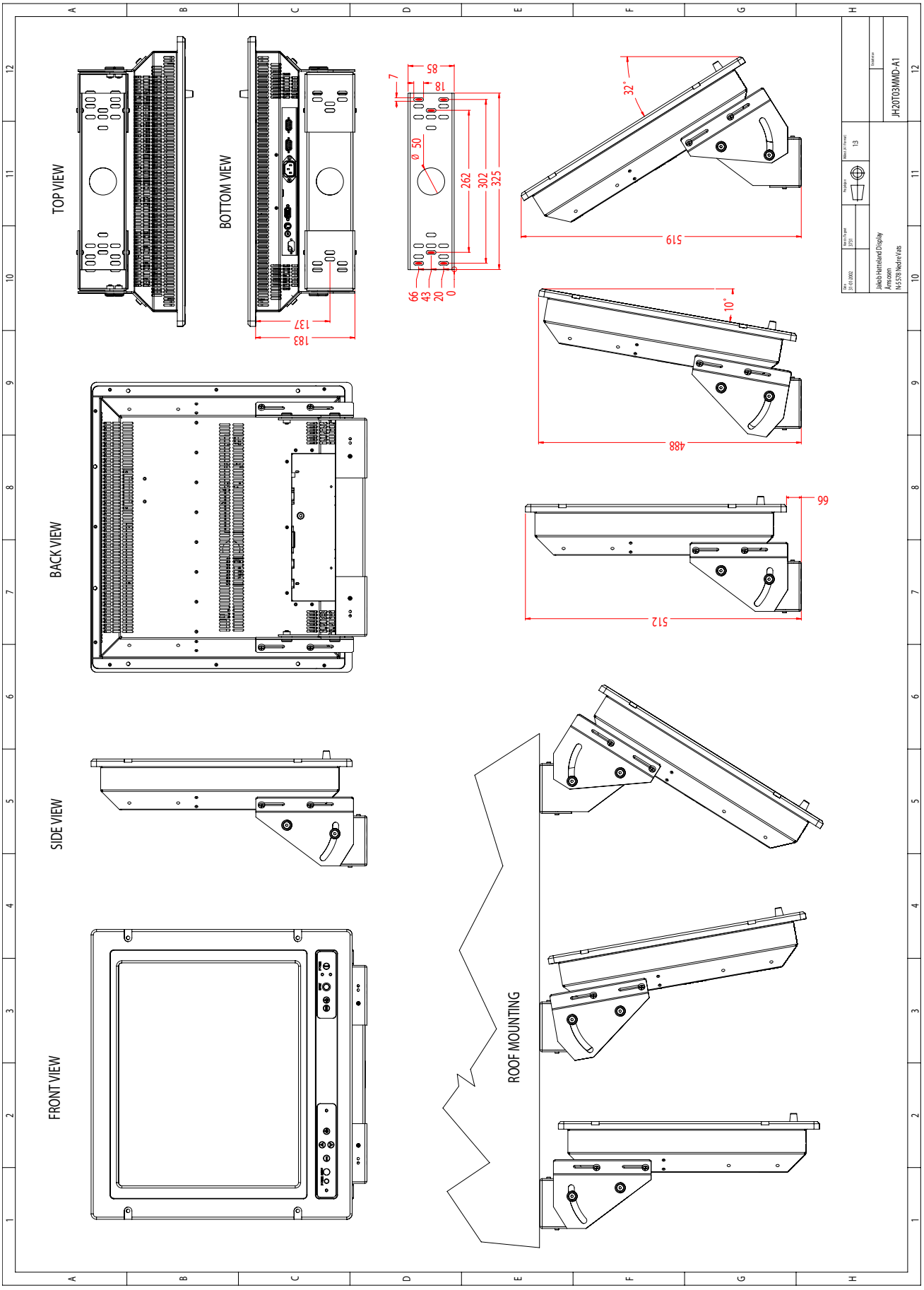
Technical Drawings - JH 20T03 MMD (NON-DVI)



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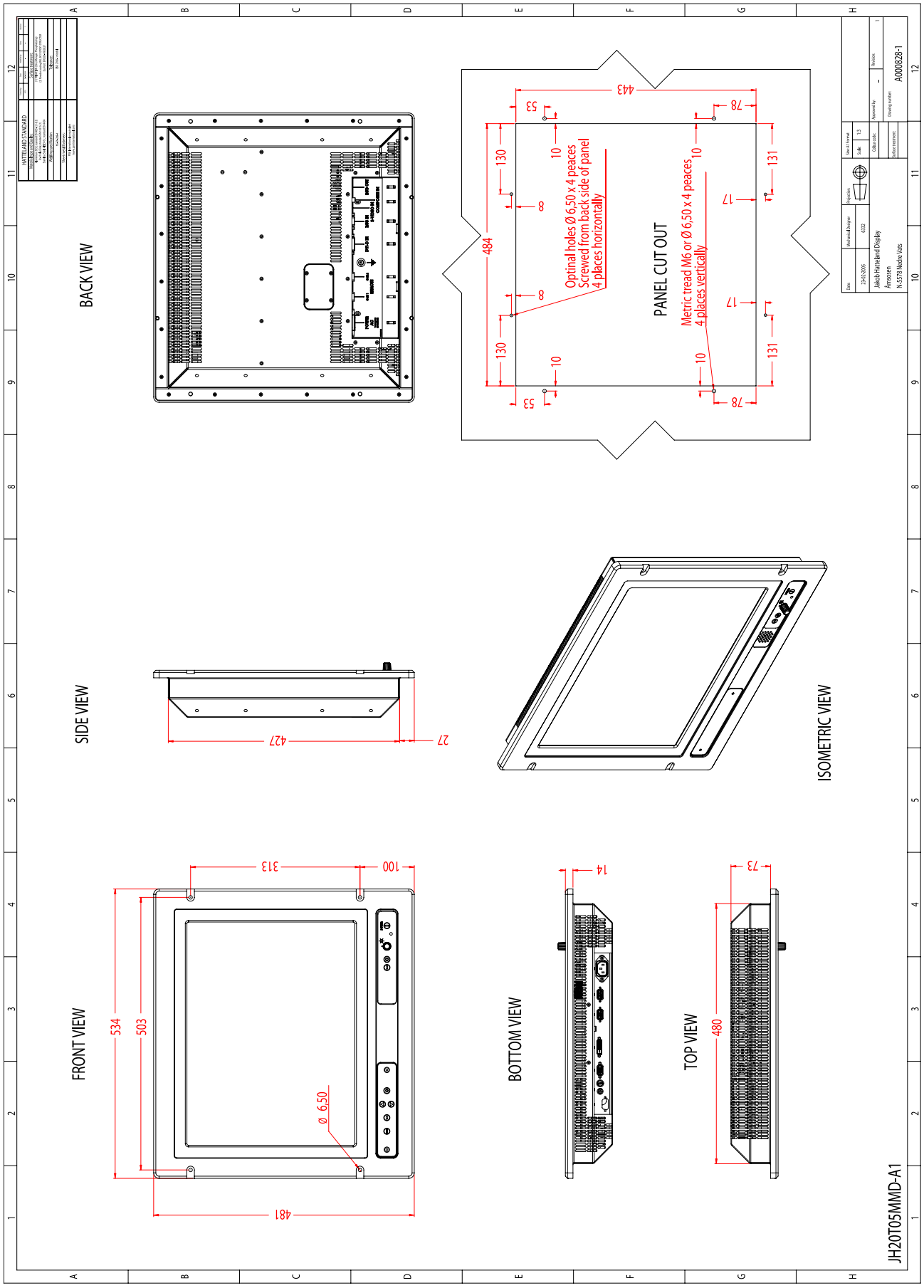
Technical Drawings - JH 20T05 MMD (DVI)



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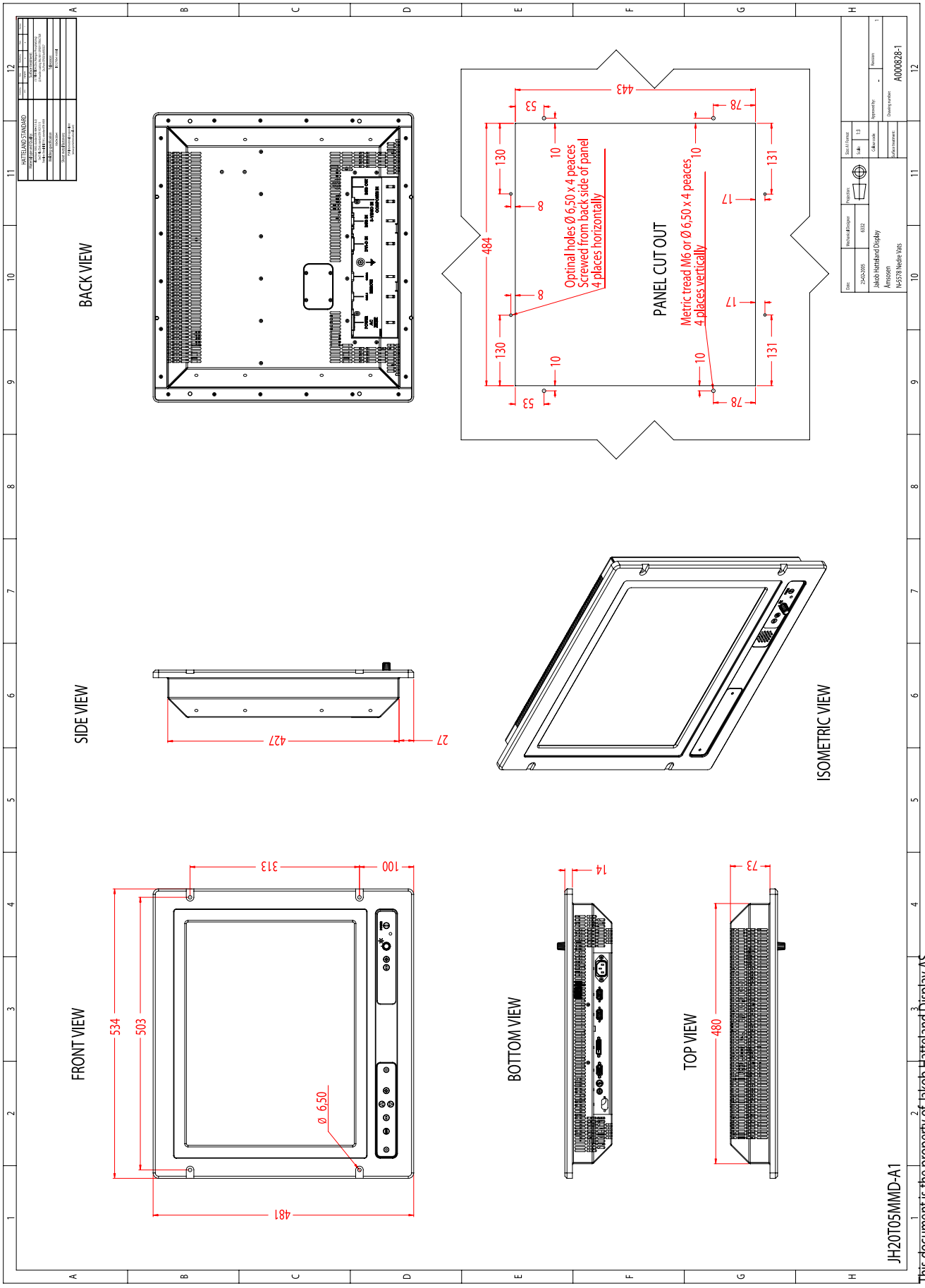

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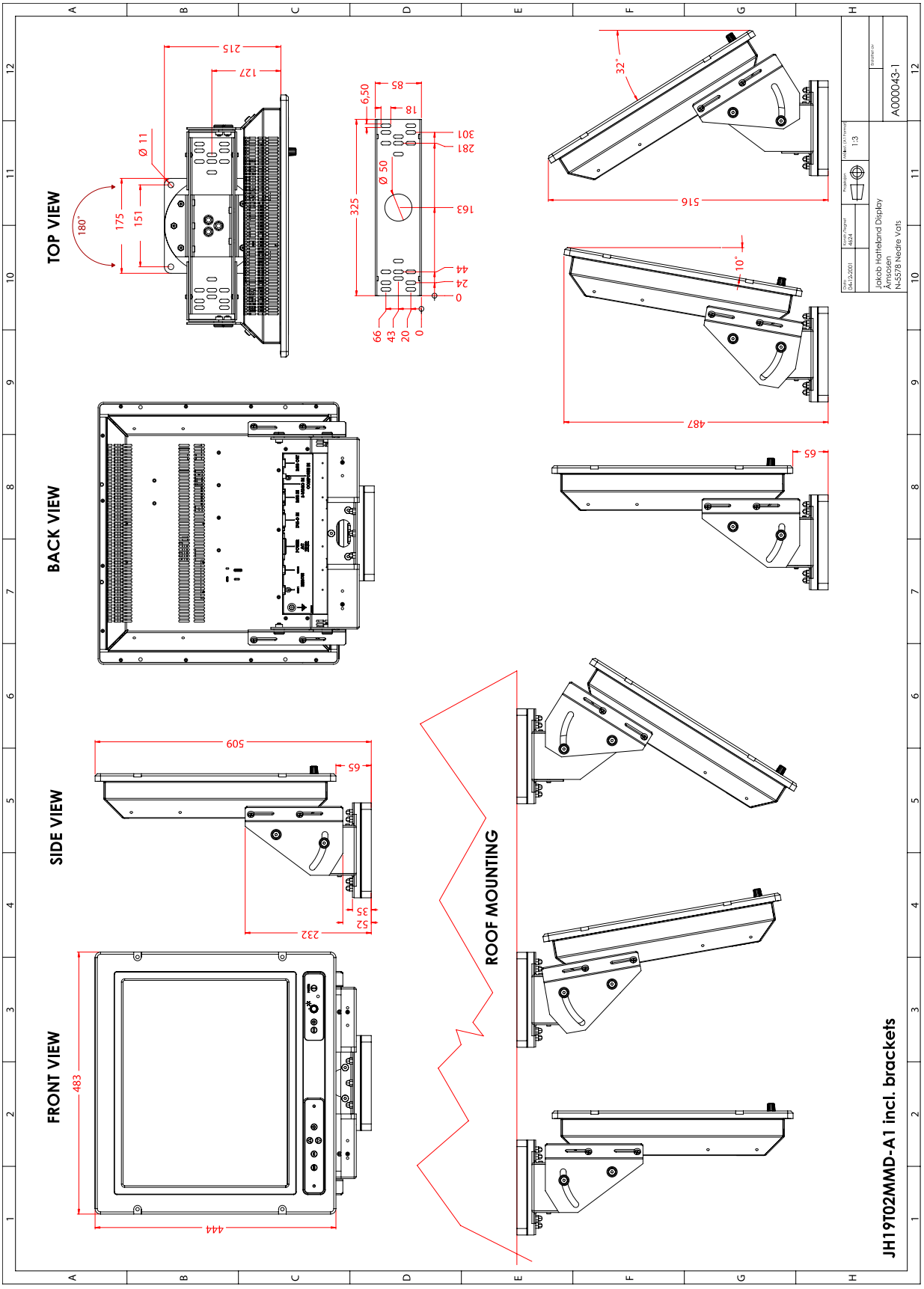
Technical Drawings - JH 20T05 MMD (DVI)

JH 20T04 MMD Drawing shown!
Correct drawing for JH 20T05MMD - Q2 2005



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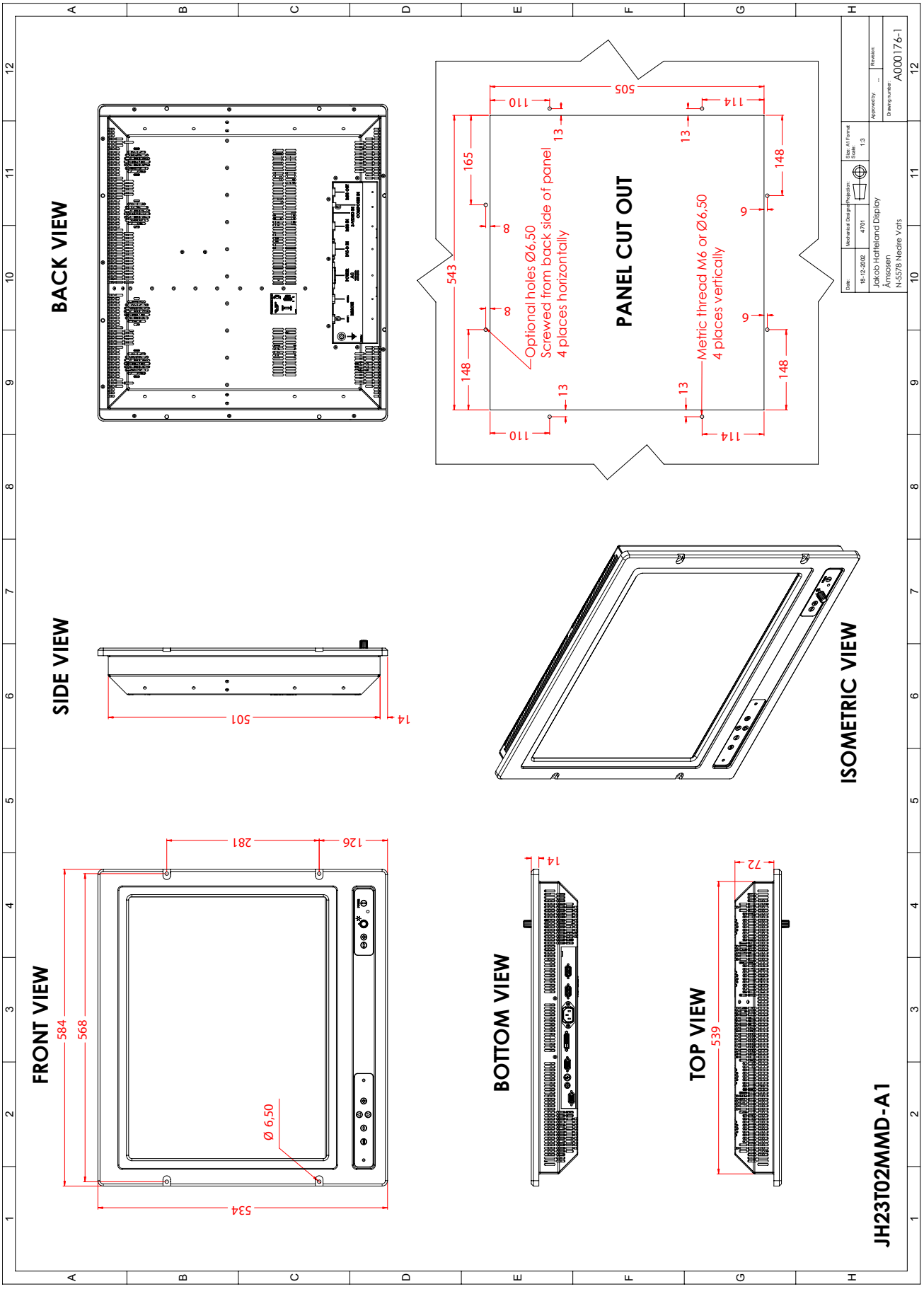
Technical Drawings - JH 23T02 MMD (DVI)



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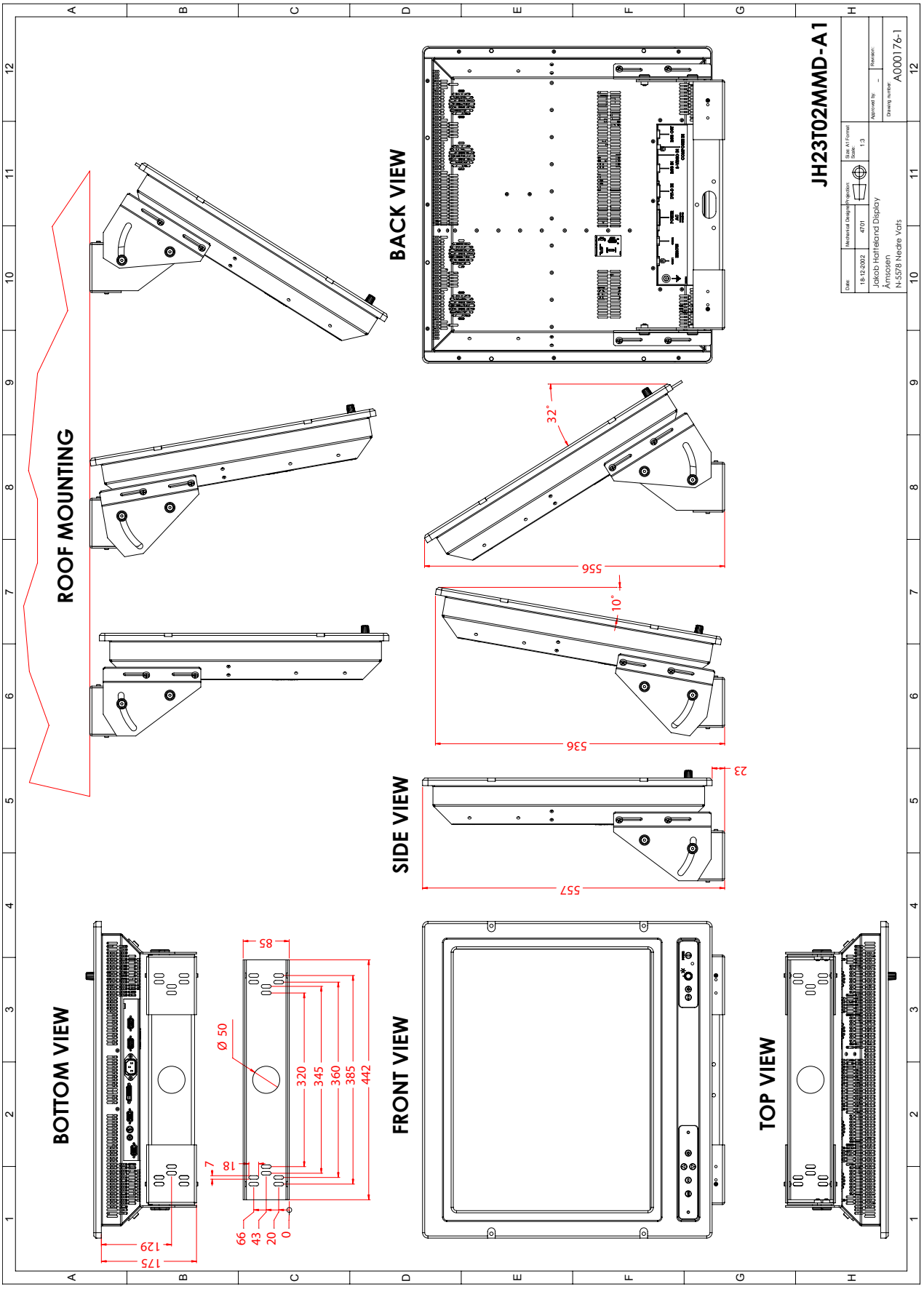
Technical Drawings - JH 23T02 MMD (DVI)



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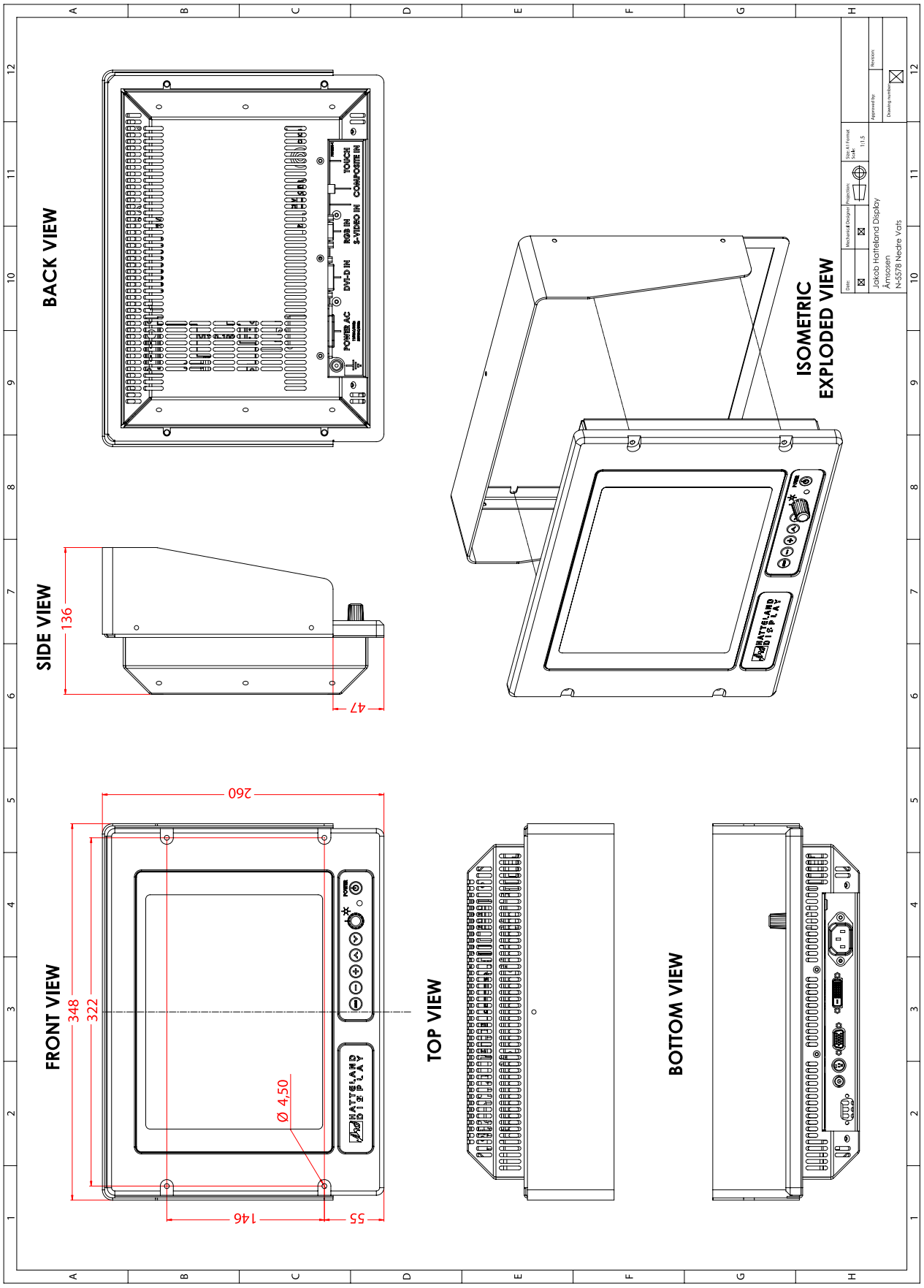
Technical Drawings - Accessories

Technical Drawings - Accessories

Suitable for: JH 10T06 MMD and JH 10T06 STD models



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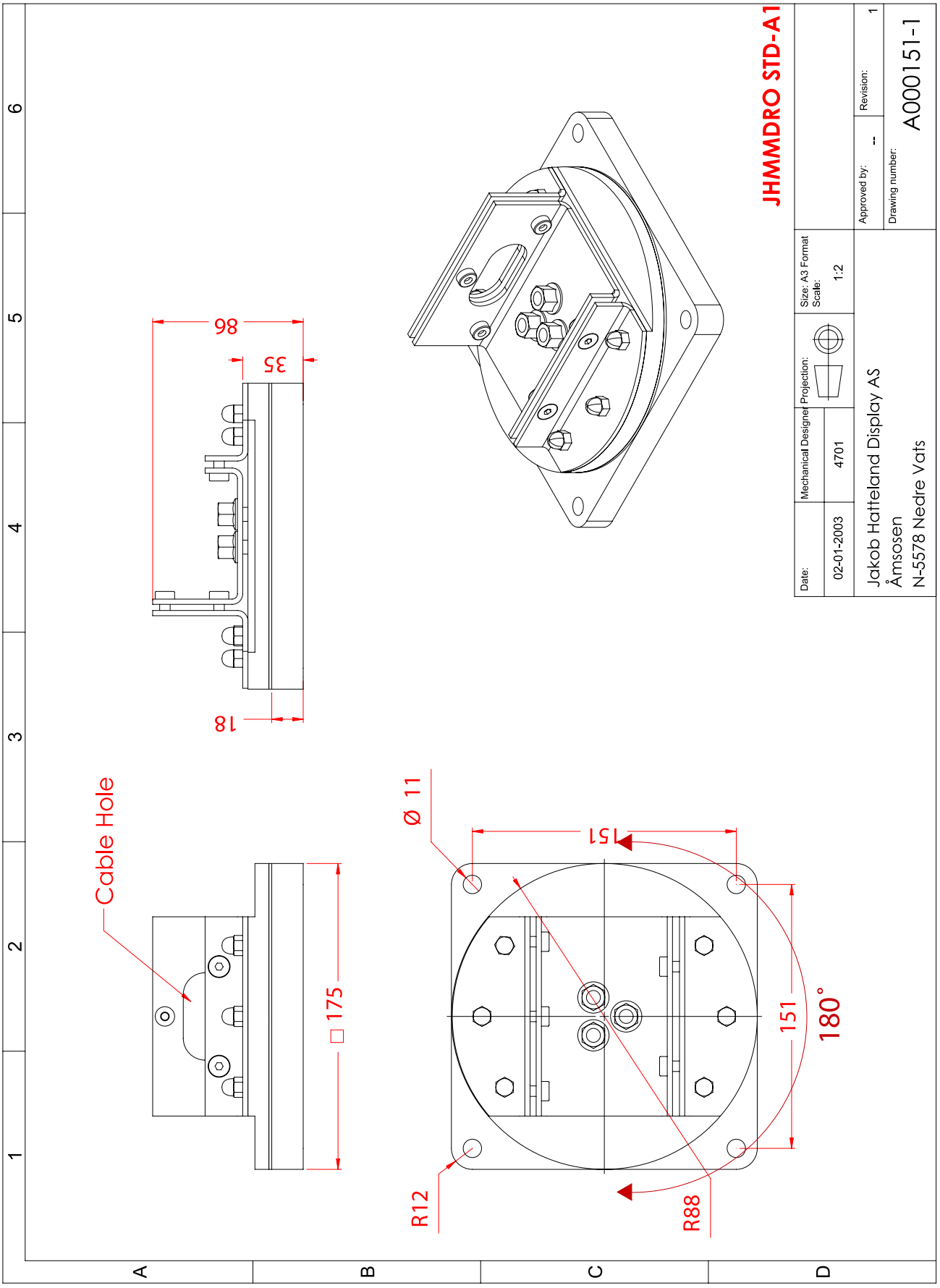
Technical Drawings - Accessories



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Technical drawings (.DWG format) are found on our internet site: http://www.hatteland.com

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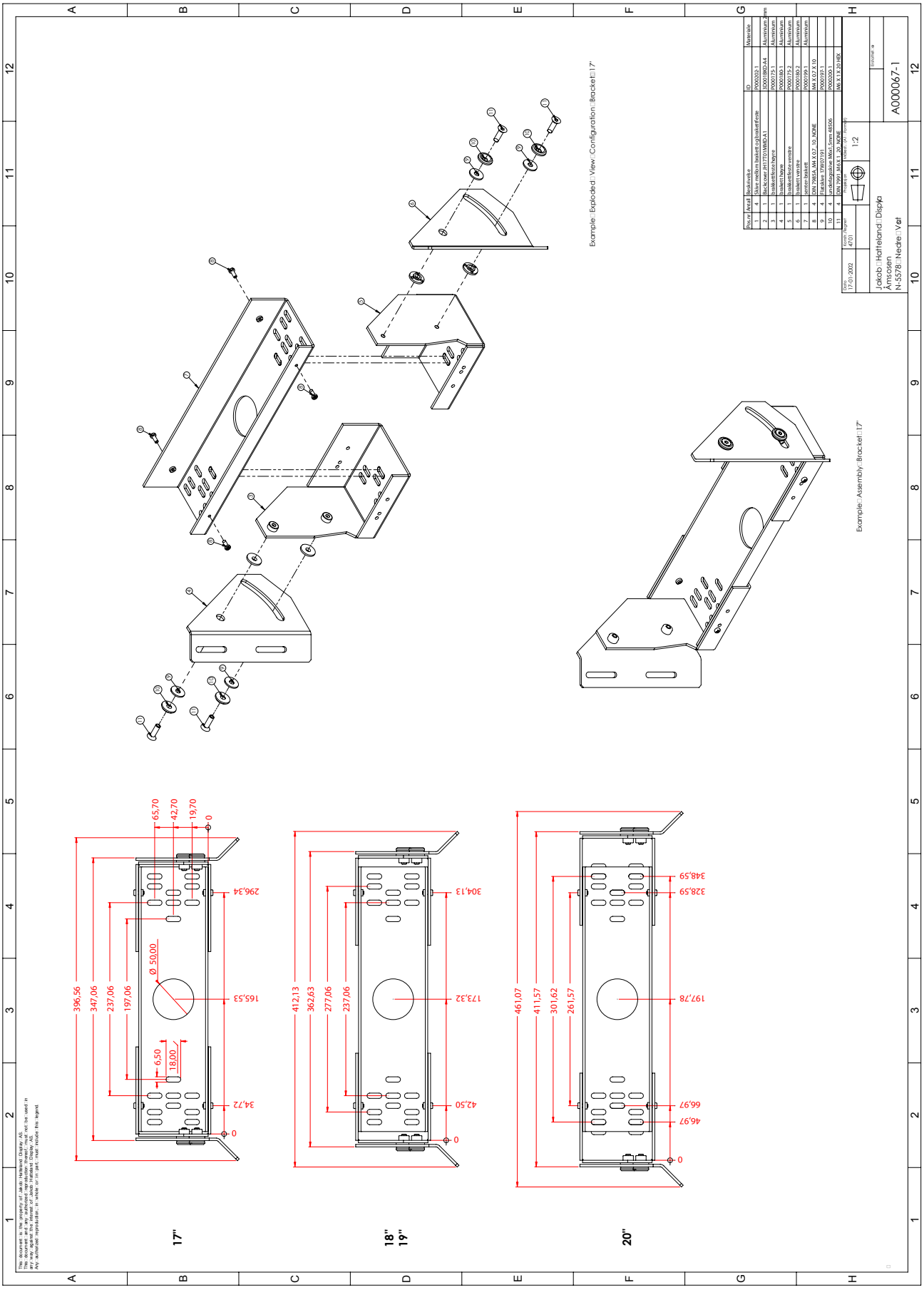
Technical Drawings - Accessories

Due to dimensions without decimals, the tolerance on drawings is +/- 1mm (For accurate measurements, measure in AutoCAD)
Technical drawings (.DWG format) are found on our internet site: http://www.hatteland.com



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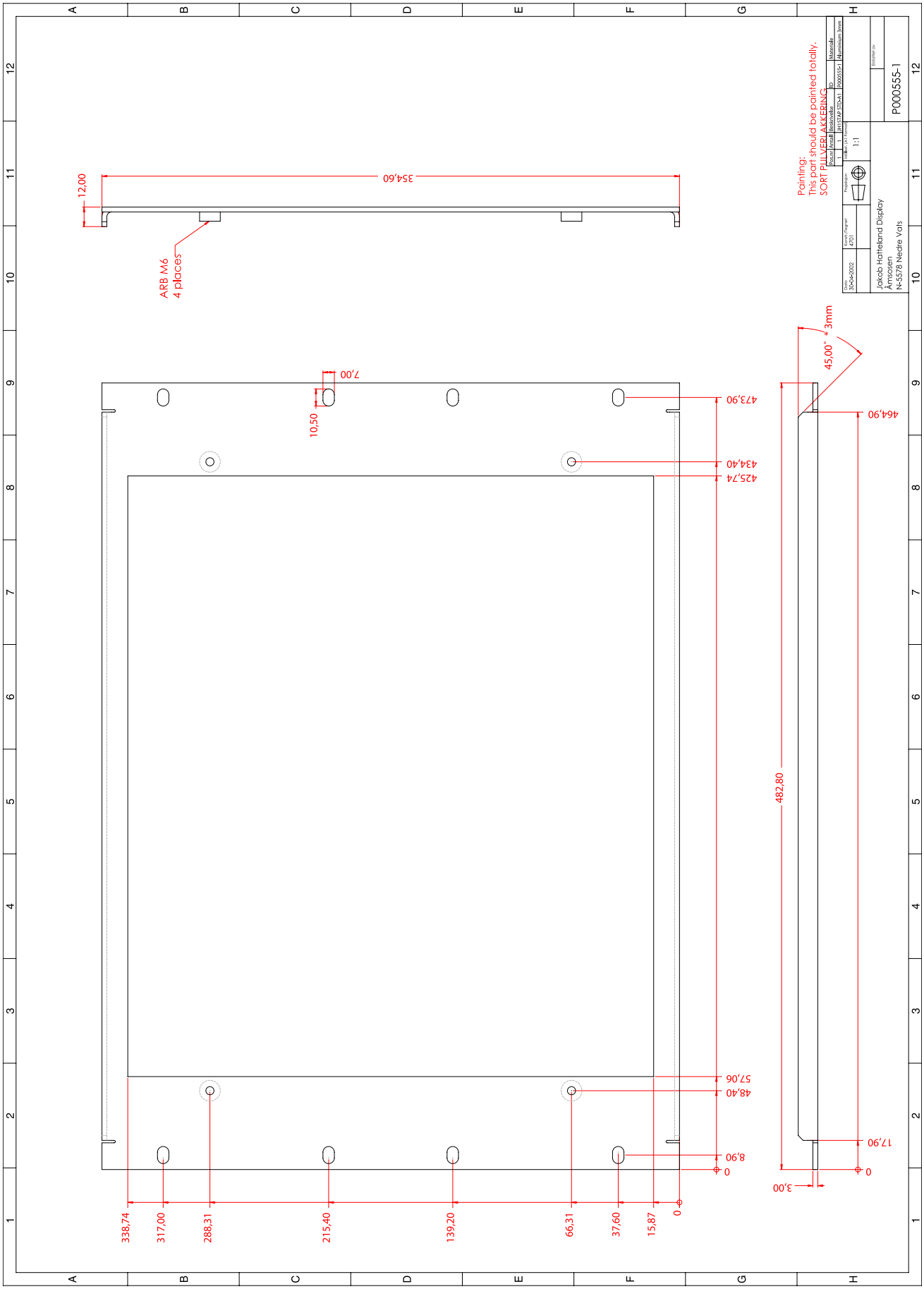
Technical Drawings - Accessories



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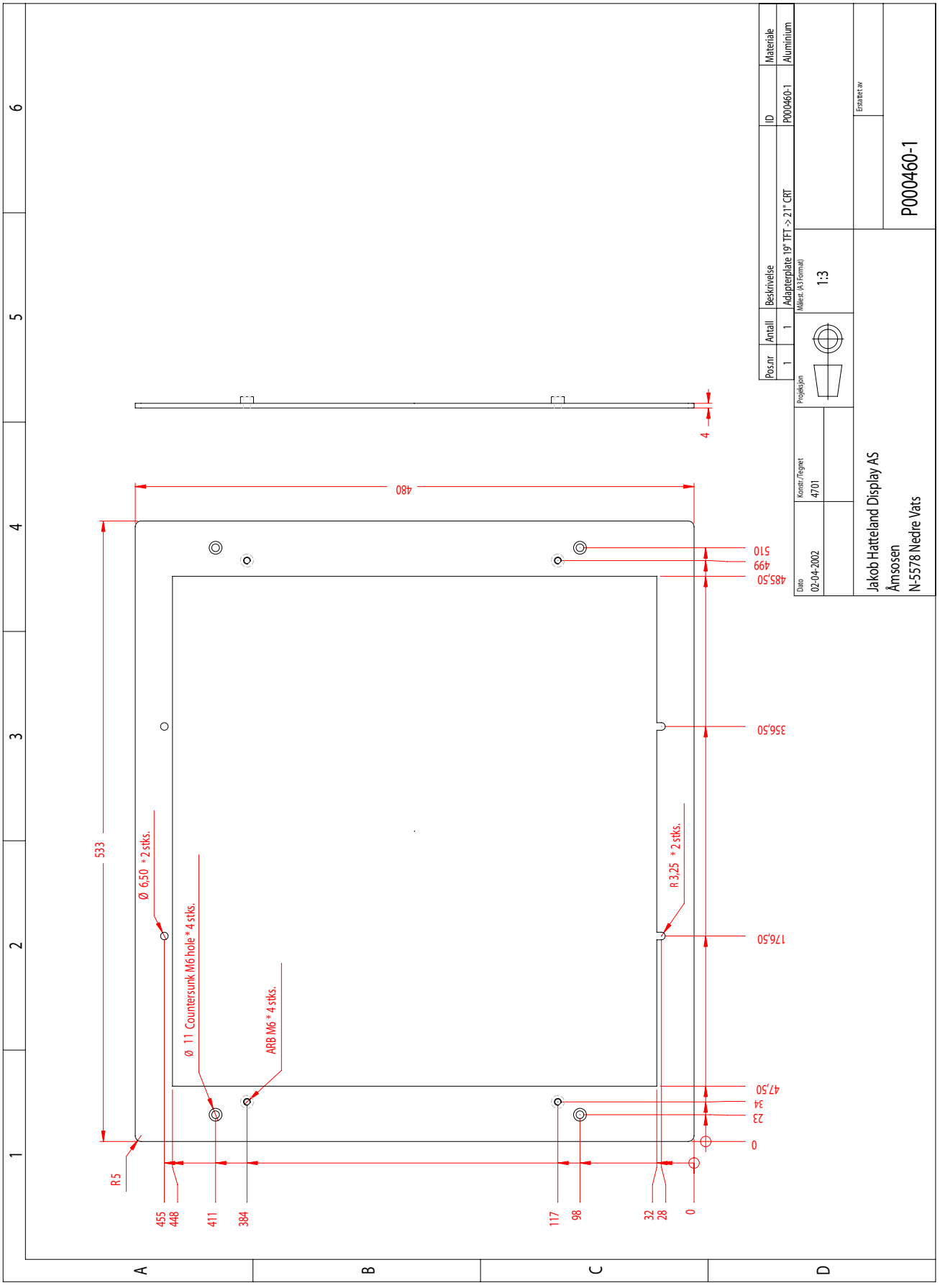
Technical Drawings - Accessories



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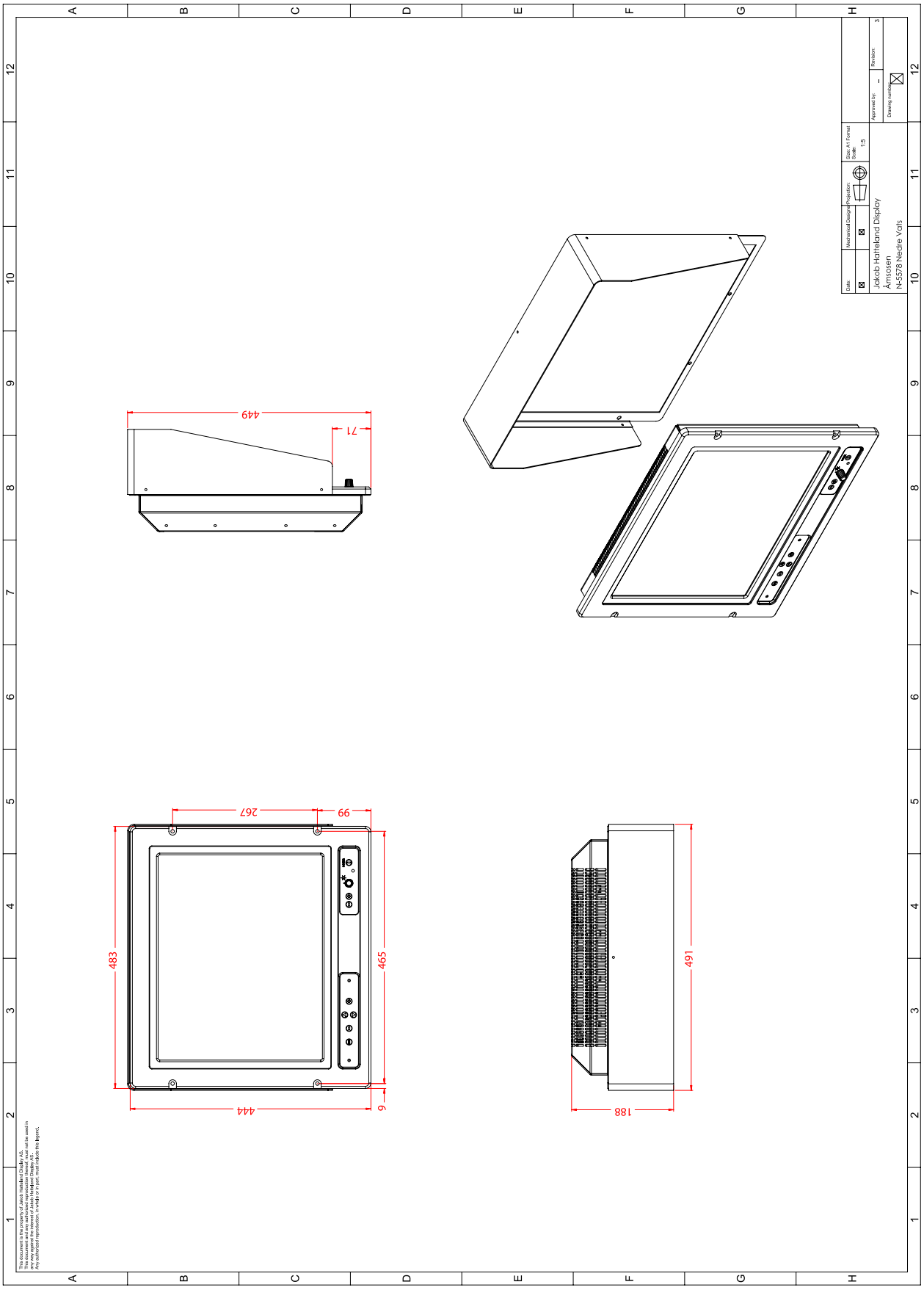
Technical Drawings - Accessories

Shown for 19 inch display. Other sizes available.



Due to dimensions without decimals, the tolerance on drawings is +/- 1mm (For accurate measurements, measure in AutoCAD)
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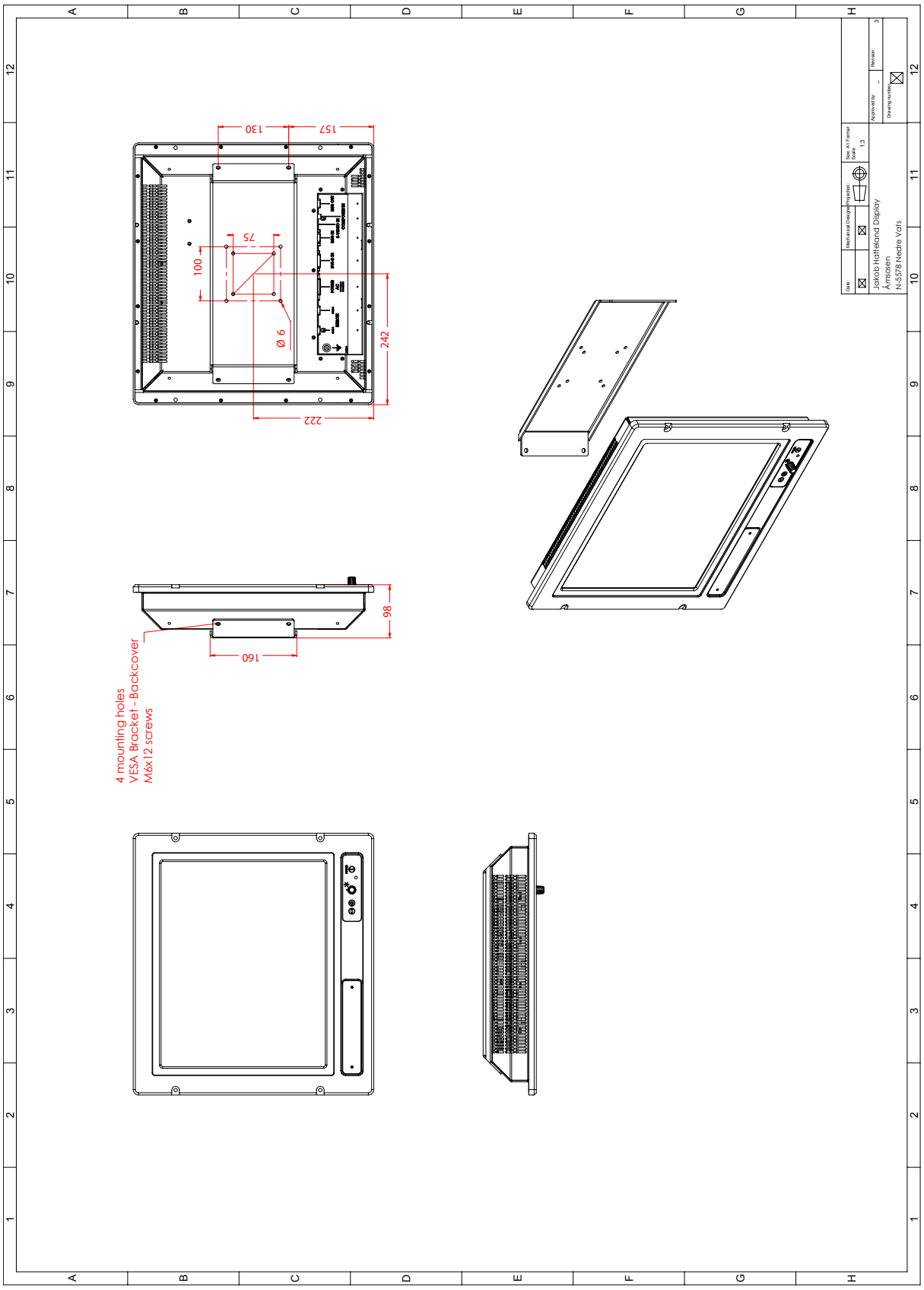
Technical Drawings - Accessories

Shown for 19 inch display. Other sizes available.



Due to dimensions without decimals, the tolerance on drawings is +/- 1mm (For accurate measurements, measure in AutoCAD)
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General - Appendix

Basic Trouble-shooting

COMMON ERRORS: (Applies for Display products and Panel / Maritime / Rack Computers)
If for some reason there should be something wrong with the picture quality or no picture present, check the symptoms carefully and try to cure it with the hints below:

NO PICTURE / LED BEHAVIOUR:
If there is no light at all in the LED at the FRONT, check power cables. If the LED in front is green then check if the brightness knob is turned to the right (max brightness). If still no picture, check if there is a VGA signal on the External VGA connector. If you have a picture on the external VGA connector please look in BIOS documentation/chapter for correct display settings in BIOS.
Lack of image is most likely to be caused by incorrect connection, lack of power, or wrong BIOS settings.

SCROLLING / UNSTABLE IMAGE:
Signal cable may not be completely connected to computer or TFT display.
Check the pin assignments and signal timings of the display and your video card with respect to recommended timing and pin assignments. Make sure that the video card is compatible and that it is properly seated / installed on the computer.

DISPLAY AREA IS NOT CENTERED / SIZED CORRECTLY
Make sure that a supported video mode has been selected on the display, or on the video card / system. If it is impossible to position the image correctly, ie the image adjustment controls will not move the image far enough, then test it again using another graphics card for the PC system. This situation can occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal, such as a signal splitter (please note that normally a signal splitter will not have any adverse effect).
If it is impossible to change to the correct resolution/color depth, check if you have the right VGA driver installed in your system.

IMAGE APPEARANCE:
A faulty TFT panel can have black lines, pixel errors, failed sections, flickering or flashing image. Incorrect graphics card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, it may scroll, flicker badly or possibly even no image is present. Sparkling on the display may be a faulty TFT panel signal cable.

CONTINUED FAILURE:
If unit after unit keeps failing, consider and investigate whether you are short circuiting the equipment or doing something else seriously wrong.

DEW CONDENSATION BEHIND GLASS:
Power on the TFT product and set brightness to 100%. Turn off any automatic screensavers on PC or similar. During minutes the dew will be gone. To speed up the process, use a fan heater for a reasonable time. Do not overheat the TFT product.

Testing & Approvals Overview

These products have been tested / type approved by the following classification societies:

Type Number	Tests	Certificated by
JH 10T06 STD Ax	**EN60529** (IP66) (Applies only for flush mounting)	
JH 10T06 MMD Ax	**EN60945 3rd** (IEC945 3rd) **EN60529** (IP66) (Applies only for flush mounting)	**ClassNK** - Nippon Kaiji Kyokai **DNV** - Det Norske Veritas **GL** - Germanischer Lloyd **BV** - Bureau Veritas
JH 15T05 STD Ax		
JH 15T05 MMD Ax		
JH 17T01 MMD Ax	**EN60945 3rd** (IEC945 3rd) **EN60529** (IP66) (Applies only for flush mounting)	**ClassNK** - Nippon Kaiji Kyokai **ABS** - American Bureau of Shipping **DNV** - Det Norske Veritas **LRS** - Lloyd's Register of Shipping **GL** - Germanischer Lloyd **BV** - Bureau Veritas
JH 19T02 MMD Ax	**EN60945 4th** (IEC945 4th)	
JH 20T03 MMD Ax	**EN60945 3rd** (IEC945 3rd) **EN60529** (IP66) (Applies only for flush mounting) **EN61174 (IEC1174)** - Bundesamt für Seeschiffahrt und Hydrographie (BSH)	**ClassNK** - Nippon Kaiji Kyokai **ABS** - American Bureau of Shipping **DNV** - Det Norske Veritas **LRS** - Lloyd's Register of Shipping **GL** - Germanischer Lloyd **BV** - Bureau Veritas
JH 20T05 MMD Ax		
JH 23T02 MMD Ax	**EN60945 3rd** (IEC945 3rd) **EN60529** (IP66) (Applies only for flush mounting) **EN61174 (IEC1174)** - Bundesamt für Seeschiffahrt und Hydrographie (BSH)	**ClassNK** - Nippon Kaiji Kyokai **ABS** - American Bureau of Shipping **DNV** - Det Norske Veritas **LRS** - Lloyd's Register of Shipping **GL** - Germanischer Lloyd **BV** - Bureau Veritas

Testing & Approvals Overview

These products have been tested / type approved by the following classification societies:

Type Number	Tests	Certificated by
JH 12T01 MMC A4	**EN60945 4th** (IEC945 4th) **IACS E10**	**DNV** - Det Norske Veritas **ClassNK** - Nippon Kaiji Kyokai **GL** - Germanischer Lloyd **BV** - Bureau Veritas
JH 15T05 MMC A1	**EN60945 4th** (IEC945 4th) **IACS E10**	**ClassNK** - Nippon Kaiji Kyokai **GL** - Germanischer Lloyd **DNV** - Det Norske Veritas
JH 19T02 MMC A1	**EN60945 4th** (IEC945 4th) **IACS E10**	**ClassNK** - Nippon Kaiji Kyokai **GL** - Germanischer Lloyd **DNV** - Det Norske Veritas
JH 23T02 MMC A1	**EN60945 4th** (IEC945 4th) (Pending) **IACS E10 (Pending)**	

HATTELAND® DISPLAY

Declaration of Conformity

We, manufacturer

Jakob Hatteland Display A/S
Åmsosen, N-5578 Nedre Vats, Norway

declare under our sole responsibility that the
MMD, MMC, STD and MIL products
is in conformity with the following standards
in accordance with the EMC Directive

EN 55022 Class A - Emission
EN 55024 - Immunity

Signature:.....
Frode Grindheim
Technical Director
Jakob Hatteland Display A/S

Signature:.....
Arne Kristiansen
Development Engineer
Jakob Hatteland Technology A/S

Date: 08 September 2004

CE

Return Of Goods Information

Return of goods: (Applies not to warrenty/normal service/repair of products)
Before returning goods, please contact your system supplier before sending anything directly to JHD. When you return products after loan, test, evaulation or products subject for credit, you must ensure that all accessories received from our warehouse is returned to JHD.
This applies to cables, powermodules and additional equipment except screws or similar, user manual, datasheets or other written paper documents. Furthermore, the product must not have any minor / medium or severe scratches, chemical spills or similar on the backcover, front frame or glass.

This is needed to credit the invoice 100%. Missing parts will not be subject for credit, and you will not get total credit for returned product. You will either be charged separately or the amount is withdrawn from the credit. If you noticed that our product missed accessories upon receival, we are of course open for further investigation and positive solutions. If you decide to ship the missing items on the after hand, you will get 100% credit for that particular invoice or items received at JHD incoming goods control. Please contact our sales personnel if additional questions.

Current prices apply as per May 2004:

Signal Cable DSUB 15P Male or Female - Approx 1,8meters	Price: 170,- NOK each
Signal Cable BNC 5P - Approx 1,8meters	Price: 350,- NOK each
RS-232 serial cable DSUB 9P - Approx 1,8meters	Price: 80,- NOK each
Powercable 110 / 220 VAC (European or US standard) - Approx 1,8meters	Price: 50,- NOK each
Minor / Medium or severe scratches / chemical spill on backcover	Price: 1300,- NOK
Any scratch, chemical spill or similar on front frame (including glass)	Price: 2000,- NOK

(Prices are approx, and any deviation are evaulated during incoming goods control)

Approved packaging methods/materials: (Applies to all shipments to JHD)
When returning goods, please make sure you surround the product with the following material, whenever possible: Original packaging from JHD, firm foam material, bubble wrap or lots of PadPack paper or Foam chips/polyester wrapped in sealed plastic bags. In any case, always use a solid cardboard box to surround everything.

Not approved packaging methods/materials are: Foam chips, expanded polyester, clothes, nothing, or too little, or anything that will crumble and get into the ventilation holes of products and cardboard boxes that are not suitable to secure the product during shipment.

Terms

The Hatteland Group - Terms Of Sale And Delivery:

1) APPLICATION
The terms of sale and delivery include the following companies: Autostore AS, Jakob Hatteland Assembly AS, Jakob Hatteland Computer AS, Jakob Hatteland Display AS, Jakob Hatteland Logistics, Jakob Hatteland Supply AS and Jakob Hatteland Technology AS.

2) PRICE
a) The price is per each, if nothing else has been stated, VAT not included. Price is based on the prices from our suppliers, current custom rates, taxes, rate of exchange and international raw material prices. We reserve ourselves the rights to adjustments in case of alternation on the above mentioned.
b) Included in the price is the supplier's standard packing. In case of re-packing/smaller quantities we reserve ourselves the right to add an additional sum for warrantable packing according to CECC 0015 (Basic inspection for protection of electrostatic sensitive devices)

3) VALIDITY
If nothing else has been stated in our quotation, the offer is valid for 30 days from the date of quotation.

4) PACKAGE QUOTATION
A package quotation means that all the components offered, must be ordered by us. If one component or more are removed from the quotation, the prices given in the package quotation are not valid.

5) TERMS OF PAYMENT
Cash on delivery or payment in advance. Net granted for companies, schools and institutions only, according to agreement. In case of too late payment 1.5% interest/month will be charged. Seller has mortage rights in the goods delivered until the purchase price, additional interests and charges have been paid in full. Accepted bill is not considered as payment until it has been honoured in full.

6) TIME OF DELIVERY
The quoted time of delivery is based on information from our suppliers. We disclaim any responsibility for the consequences of any delay or cancellation from our suppliers. Belated delivery gives not solely the right for cancellation.

7) DELIVERY POINT OF TIME
Goods are considered delivered to customer when handed over to charterer.

8) FREIGHT / PACKING / FORWARDING FEE
Jakob Hatteland Display AS charge NOK 50 in forwarding fee for orders below NOK 1.000. For orders below NOK 1.000 Jakob Hatteland Supply AS charge freight according to expenses, and NOK 25 for packing. For handling requested beyond ordinary hours NOK 250 is charged. Express service is charged with NOK 100 + freight charges. All the companies charge freight according to expenses for orders above NOK 1.000. VAT not included.

9) COMPLAINT
By receipt customer must check goods for obvious defects which have to be claimed within 8 days from receipt. Otherwise acceptance of complaint can not be counted on.

10) GUARANTEE / SERVICES
Time of guarantee is calculated from our date of shipment, and applies to the extent that we are covered by our supplier's guarantee regulations. The guarantee does no longer apply if:

I) there has been encroached upon the goods without seller's consent
II) terms of payment is not fulfilled
III) the goods have been damaged due to unskilled treatment
IV) components which are sensitive for static electricity have not been unpacked and treated in a secure way. Minimum requirements: CECC 00015's standards for handling of such components. The guarantee does not include fair wear and tear.

Terms

11) RESPONSIBLITY
Seller undertake to deliver faultless and functional capable goods according to existing technical specifications. Seller disclaim responsibility for any damage or loss which directly or indirectly may be caused due to failure or defect with the delivered goods, if carelessness from the seller can be limited up to the cost of the goods. The supplier's responsibility for defects with the supplied goods do not include secondary damage or loss.

12) CANCELLATION / RETURN
Binding sales contract is concluded when we have confirmed customer's purchase order. Any disagreements in our order confirmation must be reported to seller within 6 days. The agreement can not be altered without our permission, after acceptance from our supplier. If goods are wanted to be returned, a Return No must be assigned from seller. Returned goods without a Return No will not be accepted. By return of stock listed goods, 20% return fee is charged. Returned goods are shipped on customer's account and risk.

13) LOAN, RENT and DEMO
When borrowing of goods for demo/test, the date of return must be added to the document. If no date has been stated, date of return is two weeks from the date of the document. Before return, seller must be contacted for a Return No (RTK). Goods which have been sold with an agreed right of return within stated terms, shall also have a Return No. The Return No must be obtained before the stated date of return. Returned goods without a Return No, or which have not been packed in original packing, will not be accepted.

14) LIMITATIONS
If any of our suppliers claim limited delivery terms towards us, our terms of delivery will be restriced according to those.

15) SOFTWARE
Sold or borrowed software is not allowed to be copied or spread in other ways, without a written permission.

16) RE-EXPORT
Goods delivered from seller may be subject to special rules of exportation in their supplier's native country. Buyer is responsible to obtain necessary permissions for further export/re-sale.

17) QUESTION IN DISPUTE
To settle any dispute the Karmsund Herredsrett is approved the legal venue.

Terms

INSTRUCTIONS FOR THE CONSIGNEE

1) CONTROL

Control the goods immediately by receipt. Examine the quantity towards the invoice/packinglist/shipping documents. Look for outward defects on the packing which may indicate damage on or loss of contents. Control the container and the seals for any defects.

2) SECURING EVIDENCE

When defects on the goods have been found, evidence must be secured, and seller must be informed. Call the transporter and point out the defects. Add a description of the defects on the goods receipt, the forwarder's copy of the way-bill or on the driving slip.

3) RESCUE

Bound the damage. Try to restrict the damage and the loss. Seller will compensate expences incurred due to reasonable security efforts in addition to damage and loss.

4) COMPLAINT

Write immediately a complaint to the transporter or his agent. Forward immediately the complaint to the transporter or his agent, and hold the transporter responsible for the defects. The complaint must be sent at the latest:

- for carriage by sea: within 3 days
- for overland / air transportation within 7 days

5) DOCUMENTATION

For any claims the following documentation is required, and must be forwared to the company or their agent:
invoice, way-bill and/or bill of landing, and/or statement of arrival, inspection document, besides a copy of the letter of complaint to the transporter.

Notes

General Notes: (For all products)

- The unit is type approved according to EN60945 (1997), 4.4, equipment category b) protected from the weather.

- Other type approvals applies for the different products.
  Please see **Testing & Approvals Overview** section in this manual for more information.

- Use of brightness and push buttons may inhibit visibility of information at night.

Note for ECDIS Systems:

For ECDIS systems the brightness knob indication mark should be aligned directly with the indication mark located on the label. (See Physical Overview or Operation section elsewhere in this manual)

VGA BIOS Firmware Verify: (On MMD and similar products only)

To verify your BIOS Firmware version, the version number is displayed in the UTILITIES menu in the right top corner. If no version number shows, you may have a BIOS Firmware below V1.00

This manual currently applies for these BIOS Firmware Versions:
V0.xx / V1.00 / V1.10 / V1.2 / V1.2xx / V1.3xx / V1.5xx / V1.6xx

As the available functions are nearly indentical between older products and V1.6xx, there should be no critical need to update the BIOS Firmware. In such case, consult your local technician or sales/technical personnel at Hatteland Display if problems arise during the installation or within usage of the product, or lack of support for your signal refresh rate etc.

VGA BIOS Firmware Versions: (On MMD and similar products only)

On products from V0.xx to V1.1xx = The **advanced** version of the OSD menu by startup default.
On products from V1.2xx to V1.5xx = The **simplified** version of the OSD menu by startup default.
On products from V1.6xx = The **memorized state** version of the OSD menu by startup default.

Advanced/Service Menu:
You will have a full set of functions available for your personal perference. Only for experienced users.

Simplified Menu:
You will have a limited set of functions available for your personal perference. For the common user.

Memorized State Menu:
The menu will either be advanced or simplified upon startup of display. If user changes from simplified to advanced menu or visa versa, then this will be memorized in memory and it stays in that mode until user changes it back again. This is only active on VGA BIOS Firmware versions from V1.6xx and above.

Notes

Revision History

Rev.	By	Date	Notes
1	SE	09 May 03	First release, User Manual. Pressed & internet version.
2	SE	16 Jan 04	Second release, User Manual. Pressed & internet version. Removed Revision Record for SXGA, UXGA controllers. Removed JH 10T05 VGA and JH 18T04 MMD (obsolete during Q1 2004). Added DVI-D technical drawings for all MMD products. (where available) Added testing and approvals section Added accessories technical drawings. Added revision history. Added front page selected chapters. Revised notes section, and VGA BIOS versions overview. Reorganization of chapters and updating overall text where needed.
3	SE	14 May 04	Third release, User Manual. Pressed & internet version. Added Declaration Of Conformity Inserted Book ID on all pages and performed minor maintenance. Added more pin assignments for common connectors. (Final Pressed version 2)
4	SE	11 Aug 04	Fourth release, User Manual. Internet version. Added SXGA (DVI) and UXGA (NON-DVI) preset signal timings.
5	SE	29 Sep 04	Added note and updated label for ECDIS systems in OPERATION and NOTES sections. (MMD products only) Added Sunvisor drawing for JH 10T06 MMD
6	SE	22 Dec 04	Revised drawings with rotary bracket. Overall updates made.
7	SE	25 Jan 05	Added JH MMDBR Bracket Drawing for 17 Inch to 20 Inch (Final Pressed verion 3) Replaced JH 15T03 MMD with JH 15T05 MMD Replaced JH 19T01 MMD with JH 19T02 MMD Replaced JH 20T04 MMD with JH 20T05 MMD
8	SE	10 Feb 05	Updated specifications/drawings for 15,19 and 20 Inch (2005 version) Revised Testing & Approval Overview section. Revised frontpage with correct type number for 15 Inch
9	SE	17 Mar 05	Added JH 20T05 MMD Standard and Brackets Technical Drawings Updated datasheets where needed.

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